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THE NOCIFENSOR SYSTEM OF NERVES AND ITS REACTIONS*

BY

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LECTURE I

In these lectures I propose first of all to give an account of some recent discoveries of fact which have led me to believe that the superficies of the human body, including skin and mucous membrane, is supplied by a hitherto unsuspected system of nerves, subserving a special function. The nerves are distinct from those conveying sensory impulses, though, like the latter, they are comprised in the posterior root system. I shall begin by describing briefly the chief observations and experiments†, which were directly responsible for these conclusions—evidence for a "nocifensor" system of nerves, as I have termed it—and shall then proceed to discuss the relation of the reactions displayed to other reactions that have been recognized previously in skin.

1. Spreading Hyperalgesia from Local Injury

It is well known that when skin is injured locally tenderness develops. This is common to all subjects and to all kinds of injury, provided that these are sufficiently severe and extensive. But in many people tenderness develops readily, even when the area of injury is quite small, as when a minute fold of skin is gripped and crushed by the points of a forceps, and the tenderness is found not only at the site of injury but as a delayed effect in a more or less widespread area of surrounding skin. I must emphasize the fact that this tenderness around an area of local injury varies much in its degree and in its extent in different subjects. Thus a tiny crush of the skin may yield in some no recognizable hyperalgesia, in others it is sufficient to produce tenderness over a considerable area of skin. It will be understood that subjects in whom this outlying tenderness is displayed in response to quite small injuries and in whom the tenderness is readily detected and widespread are alone suitable for demonstrating the reactions to be described.

Crushing the skin is perhaps the most convenient form of injury to employ, because it is effected so easily and so quickly, is so readily confined to a tiny area, and is yet severe in its degree. A tiny crush of the skin of the forearm in suitable subjects causes the development of a small area of surrounding hyperalgesia within a few seconds, and this area gradually spreads to become full in about ten to twenty minutes. The full area is oval, is in the length of the forearm, and may be as long as 5 to 20 cm. (Fig. 1). It lasts for several or many hours.

The hyperalgesia is not primarily caused by the effect of painful impulses on the central nervous system; that is to say, it is not referred from the brain or spinal cord. Let a small cutaneous nerve of the forearm, such as the anterior branch of the external cutaneous be anaesthetized by injecting 1/2 to 1 c.cm. of novocain in the immediate neighbourhood of its stem, and the injury then be made in the centre of the affected area when the skin is fully anaesthetic and analgesic. The crush is unfelt; nevertheless, as soon as the nerve recovers, the usual area of hyperalgesia is found around the injury. It arises through a local mechanism, and this mechanism is nervous. This is suggested by the observation that if the injury has been made near the centre of the territory of a small cutaneous nerve, as ascertained by anaesthetizing the latter, the area of hyperalgesia subsequently developing will be found to occupy a closely corresponding area of skin. It is proved

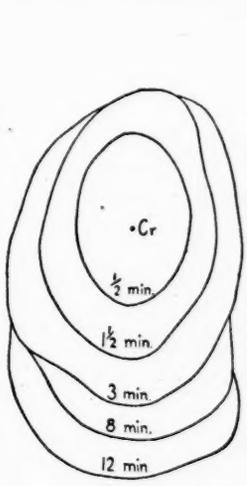

FIG. 1.

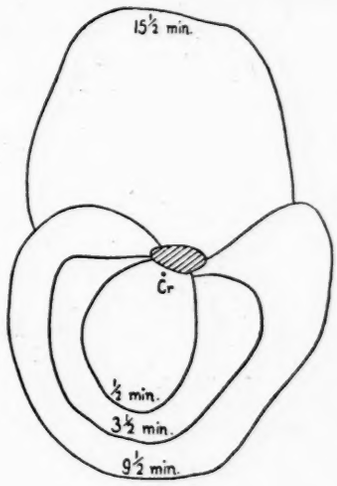

FIG. 2.

FIG. 1.—Half natural size. A tiny fold of skin was picked up in the points of forceps and crushed at Cr. Hyperalgesia was mapped out as it developed in the surrounding skin; the contours are marked with the corresponding times in minutes.

FIG. 2.—Half natural size. An area of skin was anaesthetized (shaded area) with 1 per cent. novocain to act as a barrier. A tiny fold of skin (Cr) was crushed. Hyperalgesia was mapped out as it developed; the contours are marked with the corresponding times in minutes. The anaesthetic barrier recovered between nine and a half and fifteen and a half minutes.

* The George Halliburton Hume Lectures delivered at Newcastle-on-Tyne, February 4 and 11, 1937.

† A full account will be found in my original article in *Clinical Science*, 1936, vol. 2, p. 373.

by using local cutaneous anaesthesia. The skin is injected intradermally with novocain; and the crush is made painlessly upon the centre of the small insensitive wheal of novocain. Surrounding hyperalgesia does not develop in these circumstances. The skin may recover sensation ten minutes or an hour after its injection, according to whether adrenaline has been introduced with the novocain or not; as it recovers, early or late, the usual hyperalgesia appears in the surrounding skin.

This experiment is important from two points of view. First, the failure of hyperalgesia to appear while the local anaesthetic holds shows that hyperalgesia, when it occurs, is not due to the spread of a pain-producing substance, which might be conceived to be released at the site of injury and to spread out into the surrounding skin; it shows that the action depends on the functional integrity of the nerves of the skin. Secondly, the development of surrounding hyperalgesia, as the area of crush recovers sensitivity, demonstrates that the capacity to provoke distant hyperalgesia resides in and is maintained by the crushed skin; the products of injury, so it may be conceived, act through local nerve channels as soon as these become unblocked. The products of injury, and not the pain of injury, are responsible, for as we have now repeatedly seen pain may be eliminated by blocking the nerves without affecting the reaction. Further, the unanaesthetized skin may be injured painlessly, as by suitably freezing it, and yet the result is the same. That tissue products of injury are responsible is also supported by the fact that the time at which hyperalgesia develops depends on the intensity of injury; the time is shortest when the skin is smashed; it is long when the skin cells are injured but not killed, as when a faradic current or freezing is employed. It is to be emphasized that the action happens through purely local nerve channels; the central nervous system is not concerned in this. It is a reaction explicable only on the basis of what has been termed an "axon reflex," the impulse travelling up a nerve fibre and returning shortly through a side branch.

We may proceed further to consider the arrangement and kind of nerve fibres that are involved. When hyperalgesia fills a large territory in response to injury confined to a central and quite small injury it is clear that, if we conclude hyperalgesia to be provoked through local nervous channels, the small area of injury must be connected by nerve paths to all parts of the large territory. Thus we are brought to believe that the nerves under consideration are nerves the axons of which divide freely to form arborizations or networks in the skin. Further observations support this idea. It has been stated that, when a tiny piece of skin is crushed in the centre of a small circular area of skin anaesthetized by intradermal injection of novocain, hyperalgesia appears only when the anaesthesia recedes and exposes the crush. If the injury is made eccentrically then it becomes exposed earlier during the recovery and while the skin still remains anaesthetic on one side of it. Under these conditions the hyperalgesia appears early on the side of exposure; it fails to appear on the other side until the intervening barrier of anaesthesia has recovered. Similarly, if the skin is crushed quite near to a barrier of locally anaesthetized skin (Fig. 2), hyperalgesia develops, but again it fails to pass beyond the barrier. Crush the skin a little farther away and the hyperalgesia in this case tends to creep around the barrier. Observations of this kind indicate that the nerves through which the reaction develops lie largely in the skin itself, and seem to indicate that the fibres concerned belong to complex and overlapping arborizations rather than to networks.

Hyperalgesia of the kind discussed is the ultimate result of a reduction in the threshold of sensory nerves subserving pain; but while this is to be accepted it should not mislead us into believing that the nerves through which the local state underlying hyperalgesia is provoked are pain nerves. Consideration, indeed, shows that this cannot be so. The nerve fibres primarily involved in provoking the reaction are freely arborizing. Accurate localization of painful stimuli, such as we know exists, could not be effected through a system of this kind, for impulses travelling from widely separated end-branches of a given arborization would each finally travel by the same path and produce an identical effect upon the central nervous system. An additional argument against nerves of pain being involved is that the nerves underlying the production of spreading hyperalgesia in response to local injury are very readily thrown out of action by asphyxiating them, while the pain nerves are much more resistant (unpublished observations). It is clear, therefore, that the pain nerves are concerned merely in registering an altered state of the tissues; and this altered state is produced through a distinct system of nerves. But the argument, derived from our ability to localize stimuli, applies not only to the pain impulse but to all other forms of cutaneous stimulation, namely, to touch, warmth, and cold; for all these sensory impressions are localized with accuracy, and none, therefore, can be subserved by a system of widely branching axons. Of known nerves there remain only the sympathetic fibres, sweat nerves, pilomotor nerves, and nerves supplying blood vessels. It is of interest to note that in the case of sympathetic nerves it has previously been concluded that freely branching axons having the required anatomical arrangement exist in skin; such has been proved for the pilomotor nerves (Lewis and Marvin, 1927). But observation shows quite conclusively that the sympathetic system is not concerned in the production of spreading hyperalgesia, which can be as easily provoked by small injuries in skin deprived of its sympathetic nerves as in normal skin; this has been tested in patients from whom the cervical sympathetic ganglia have been removed and the nerves to the tested skin of the arm have been allowed to degenerate. Now the sympathetic nerves and nerves of the posterior root system are the only nerves that supply skin; and complete destruction of the former leaves the reaction intact. Therefore the nerves we seek must belong to the posterior root system, though as we have seen they are not sensory nerves. Thus we are brought seriously to consider a system of nerves hitherto unrecognized. That the sensory and sympathetic nerves form the complete cutaneous supply is an idea for which there is in fact no sure foundation. We have come to recognize given systems of nerves by their manifestations; first, sensory nerves, because they were found to convey sensory impressions to the brain, and afterwards vasomotor, pilomotor, and sudorific nerves as changes in blood supply, erection of hairs, and sweating became recognized to be under the governance of nerve systems. It will be evident that any system of nerve fibres, which in the exercise of its function gives rise to no obvious and distinctive external manifestations, will tend to escape recognition. That is what has happened up to the present time in regard to the nerves now discussed. The present need to postulate a new system of nerves has arisen to explain hitherto unrecognized phenomena. Because the nerves in question are associated with local defence against injury I call them "nocifensor nerves." The defence that I have primarily in mind is the protective hyperalgesia that has been described; but I also have in mind the possibility of other protective reactions to be described.

I pass to the second reaction.

2. Hyperalgesia from Distal Stimulation of Cutaneous Nerves

Hyperalgesia of the skin can be provoked not only by injuring the skin locally but also by stimulating cutaneous nerve trunks. The nerve can be stimulated by faradic current either through the skin or preferably by introducing a small and special electrode through the skin. Such hyperalgesia is confined to and usually fills the territory of the corresponding nerve. The change produced in the affected skin is undoubtedly the same as that produced as a spreading response to local injury; the hyperalgesia has the same qualities, develops after delay and slowly, and lasts for correspondingly long periods of time. We may conclude without hesitation that in both instances the same special system of nerve fibres conveys impulses to the skin, though the impulses start from an area of injury in the one case, and directly from the nerve trunk in the other. That the action in the case of nerve trunk stimulation is a distal one, and is not brought about through the conduction of impulses to the central nervous system, and by reflection or reference from this, may be proved in this instance also. If the nerve trunk is blocked by a little anaesthetic injected into it, and it is then stimulated above the block (Fig. 3), hyperalgesia does not develop subsequently in the nerve's territory, though the central nervous system receives the full sensory stimulus. But if stimulation is below the block (Fig. 4) it is painless, and when the block recovers the usual area of hyperalgesia is found. Thus the evidence is harmonious in showing that there is a common end-effect, a changed condition of the skin produced through a local and common effector mechanism.

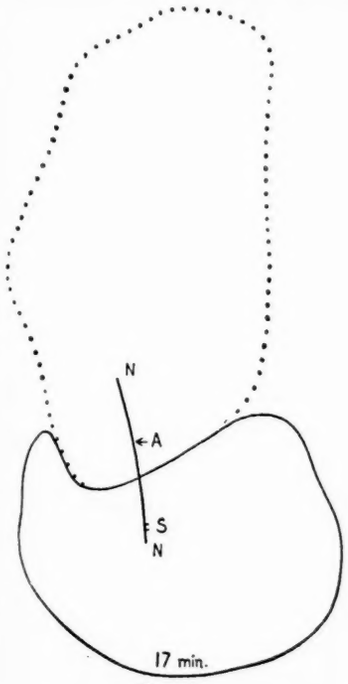

FIG. 3.

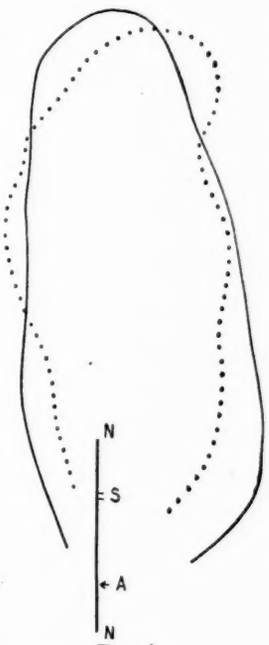

FIG. 4.

FIG. 3.—Half natural size. A subcutaneous nerve NN was anaesthetized at A by local injection of novocain; the area of defective sensibility resulting is mapped by the dotted line. The nerve was stimulated by faradic current passing through the skin into the nerve at S, proximal to the block. The only hyperalgesia subsequently developed is shown by the area mapped by the solid line at seventeen minutes. (From *Clinical Science*, **2**, 386.)

FIG. 4.—Half natural size. The same nerve was anaesthetized at A and stimulated distal to the block at S. The area of hyperalgesia developed after the recovery of the block is mapped by the solid line. (From *Clinical Science*, **2**, 386.)

It will be of interest briefly to discuss the nature of this change in the skin which is common to the two reactions described, though it cannot be said that we are more than beginning to understand it. When the skin is injured locally and surrounding hyperalgesia is allowed to develop, local anaesthetization of the damaged skin will not abolish the hyperalgesia, which continues unchanged under as much as an hour's observation. Once hyperalgesia has appeared it is maintained, although receipt of new impulses has been brought to an end through the blocking of the nervous channels issuing from the site of original injury; the change which has happened in the affected skin is a relatively stable affair. A precisely similar stability is shown in the case of the hyperalgesia provoked by direct nerve stimulation. In this instance there is no durable change at the point of nerve stimulation, which might be thought to maintain a state of hyperalgesia in the skin; for nothing develops in skin, which is guarded by peripheral nerve block over the actual period of nerve stimulation, when that block is released. It is again clear that the skin supplied by the nerve is itself the seat of disturbance and that the change that happens there is a lasting one. For reasons which I cannot satisfactorily and fully relate in these lectures I have interpreted this change (Lewis, 1936) to be an altered state of the skin cells, with a discharge from these of substances that, by acting locally, reduce the threshold of the pain nerves. In this connexion it is of interest to note that Foerster (1925) has recorded the occurrence of pain during distal stimulation of divided cutaneous nerves in man. On the lines already laid down I attribute his interesting observation to the release of pain-producing substance, which acts on overlapping endings of neighbouring sensory nerves, and find support for this view in Foerster's statement that section of these neighbouring nerves abolishes the pain.

While it is legitimate to conclude in my own observations that the hyperalgesia, accompanied as it often is by a little sense of burning, and the pain in Foerster's observation are both due to the onset of a new and relatively stable state in the affected skin, the view that this comprises a release of pain-producing substance must be recognized as more hypothetical. It will remain so until more direct evidence of actual release becomes available. That the nerves act by increasing the permeability of the walls of the cutaneous cells, and thus cause a release of substance or substances, is but one of several possible ideas which might plausibly be put forward in explanation. But it is the conception which at the moment I am most inclined to favour.

Clinical Applications

Before passing on to other reactions of the skin I pause to comment on certain practical clinical bearings of the observations that have been described. The first reaction, that of spreading hyperalgesia in response to local injury, is an event of everyday life. Such hyperalgesia is often to be found around abrasions and other small injuries of the skin, for example, those produced by insect bites. Areas of hyperalgesia, extending widely around inflammatory lesions of the skin, almost certainly arise through a similar mechanism. So does tenderness referred from stimulation or inflammation of the mucous membrane of the maxillary antrum (Fig. 5), or from teeth in the upper jaw, to skin in the territory of the maxillary nerve. Thus it is evident that the observations and experiments described bring a clear understanding of

many instances of superficial hyperalgesia such as are encountered in patients. As to whether or nor referred cutaneous tenderness from visceral disease employs the same effector mechanism will be decided by new investigations.

The second reaction, the production of hyperalgesia through stimulation of cutaneous nerves, finds its counterpart in certain cases of peripheral nerve lesion. The cases to which I refer are those relatively rare ones, examples of which were first recorded by Paget (1853), Charcot (1859), Weir Mitchell (1872), and others, in which as a result of bullet wounds or other injury the nerve in a limb (usually the median), though undivided is contused, or becomes involved in chronic inflammation. In such cases and after a notable latent period of a few or many days, the skin of the corresponding territory becomes exceedingly tender to friction and intolerant to warmth. The pain, like all continuous skin pains, is described as burning in quality—whence the term "causalgia"—and is so easily elicited and so severe when provoked that the patient guards the limb closely, holding it flexed and covered, and shrinking from all threatened contacts. Such cases have long been suspected to owe their suffering to

FIG. 5.—A diagram of hyperalgesia of the facial skin appearing within an hour of stimulating the mucous membrane of the outer wall of the maxillary antrum with a faradic current. Similar hyperalgesia appears with catarrh of the same antrum. (From *Clinical Science*, **2**, 393.)

irritation of the nerve trunks, sensory impulses being conveyed directly to the sensorium from the region of the wound. But my observations provide a definite basis for a new suggestion, namely, that the pain may arise from the irritation not of sensory but of "nocifensor" fibres in the nerve trunk. In the latter instance it would arise indirectly and after a period of delay, the state of the skin being changed and thus lowering the threshold of the pain nerves running to it. The existence of such a mechanism, the pain-provoking agency being in the skin and not in the nerve trunk, would explain those curious and otherwise inexplicable instances cited by Tinel (1918) in which section of the nerve distal to the nerve lesion has brought relief of pain. Another reason for suspecting an action of the damaged nerve distally is found in the associated changes in the skin, including reddening and herpetic eruption; but further discussion of this aspect of the question I shall defer to my second lecture.

Another type of case is that in which a finger has been crushed, torn, or otherwise injured, and in which, though healing occurs, similar intractable tenderness and pain develop and often spread to the adjoining finger. For these instances of reference to an adjoining finger it has become quite probable that the painful phenomena are produced through the intervention of nocifensor nerves; though it is to be stated that further observations directed to this question are desirable as opportunity offers.

We pass on to the third reaction.

3. Flare from Local Injury

The flare surrounding local injuries has been so fully described in my writings on the "triple response" that I shall here confine myself to what is relevant to the main thesis of these lectures. If a small piece of skin is crushed or is injured in any other way a vascular flare appears around it. This flare is due to the dilatation of the small arterioles in the skin over an area usually of about 5 cm. diameter, though sometimes visibly extending for much greater distances. It has been proved to occur through the intervention of a nervous reflex, the impulses travelling locally through branching axons of skin and directly underlying tissue. Thus the flare can be provoked after all nerves to the skin have been divided. It disappears when after section the fibres of the cutaneous nerves have had time to degenerate. It is lost when the posterior root ganglia (or the fifth nerve ganglion) have been destroyed; but it is not lost after degeneration of the sympathetic nerves to the skin has taken place. Thus the nerves underlying this reaction are known to belong to the posterior root system, and for this reason have been thought to be sensory. This latter view, based as it was on reasoning by exclusion, I am unable any longer to hold. The resemblance between the nervous mechanism of this reaction and that of spreading hyperalgesia is so close as to draw strong attention to itself. The reason for first suspecting the nerves underlying the hyperalgesia to be separate from any of the sensory nerves was that the phenomena displayed require for their explanation a branching system of axons, a system regarded as incompatible with accurate localization of sensation. A parallel argument applies in the case of the flare. The stimulus that provokes this flare arises locally; nerve impulses pass out from a small place of injury and travel to small cutaneous arterioles supplying the whole area flushed. Thus each small area of skin must be united through axonic nervous channels to all regions displaying vasodilatation. A branching system of axons, incompatible with the function of sensory localization, is again needed to explain this local reflex.

It is to be noted in the case both of flare and hyperalgesia that the original stimulus is a small local injury, like a crush, and that in each instance independent evidence has been obtained that the receptor endings of the nerves are stimulated by substance released. The paths taken by the nerves through the skin, as displayed by the effect of anaesthetic barriers, are remarkably similar in the two instances. Asphyxia affects both reactions early, though the flare is affected distinctly later than the hyperalgesia (unpublished observations). All this evidence leads us to conclude as in the case of hyperalgesia, so in the case of the flare, that the nerves concerned are not sensory, but that those underlying the two reactions are related to each other. But farther than this in identification we cannot go.

I have described the similarities that seem to me sufficient to allow us to place these nerves in a common system. There are also important differences. The substances released by (and at the point of) injury and responsible for the two reactions are different. The flare is caused by the release of a histamine-like substance; the substance causing hyperalgesia is certainly distinct. Again, the end manifestations are different in character and they are of very different duration. Each reaction may have its appropriate stimulus and receptor

mechanism, each may have its distinct effector mechanism ending, the one perhaps on skin cell and the other perhaps on arteriole. These possibilities are all in accord with the facts as these are known, and we should be justified, therefore, in regarding the two series of nerve paths as separate. The general conception would be similar to that which we take in the case of pilomotor and sudorific nerves. Here also are two series of nerves following similar branching axonic paths in the skin; but they arise differently, end in connexion with different cells, and produce for that reason dissimilar effects; but both belong to the same general system, the system of sympathetic nerves.

[A full List of References will be given at the conclusion of the second lecture.]

FOOD AND NUTRITION*

BY

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[In the opening part of his lecture Professor Cathcart gave a brief review of the food side of the problem in the light of present-day knowledge, stressing the great gaps in this knowledge that still exist.]

When we turn to the question of nutrition we enter a realm which is largely speculative. There are those who hold that the state of nutrition is definitely, and by inference only, an index of the adequacy of the diet. Personally, in common with many others, I believe the state of nutrition indicates much more than the adequacy of the diet.

We all believe that we can decide, with a certain degree of assurance, whether the state of nutrition of a given individual is good or not, and yet, at the same time, if we were asked to state why we reached our degree of certainty we would be hard put to it to give an explicit answer. In other words, we do realize that in this state there is something more involved than mere physical attributes like stature, bulk, bloom of skin, gloss of hair, and so on; that there are also intangible psychic factors which may be summarized in terms like "alertness," "fitness," "aliveness." We judge normally by the "wholeness" of the picture. It is a question of the primacy of the whole over the separate parts. We arrive at our assessment by a kind of intuition based on our own particular experience.

I have no doubts in my own mind that the term "nutrition" should be retained for a wide conception of the state of well-being which characterizes the individual who is both physically and psychically sound. Those who wish to refer only to the influence of food on the body, who, in other words, wish to limit their conception, would have quite a useful and sufficient word in *alimentation*. They could speak then of states of good and bad alimentation—that is, the states resulting from the ingestion of adequate or inadequate diets. If the words were not quite so exotic we might adopt, for differentiation, the words used by the Greeks—*eusitia* and *eutrophia*. I understand from my classical colleagues that the Greeks, more precise in the use of words than we are, differentiated between well-fed (eusitia) and well-nourished (eutrophia). These words have the additional advantage that a negative form dysitia and dystrophia may be used. I believe it must be accepted that when we speak of, say, excellent nutrition (eutrophia) and malnutrition (dystrophia) we are speaking of clinical syndromes, because in everyday practice it is found there is no physical yardstick by which the degree of nutrition can be measured. Moreover, every medical man realizes the extent to which physical conditions like weight can be dominated by psychical states, and how, for instance, an immobilized limb can atrophy despite an adequate food intake. It is quite clear to me at least that when we use that much-abused term "malnutrition" we are referring to a state of the body which is not solely dependent on the inadequacy of the food intake; that many other factors like lack of sleep, of play, of fresh air, of happiness, absence of worry, and so on play parts in the determination of the condition. It is admitted, of course, that an adequate supply of proper food is absolutely essential, but food alone cannot work miracles.

"Malnutrition"

I have stated that there is no measure by which the degree of "malnutrition" can be defined; hence it is not surprising that where each individual medical officer makes his own subjective judgement, a judgement which can be distorted by all manner of personal, but probably in the majority of cases unconscious, predilections, wide variance in the extent to which "malnutrition" is reported to exist in given areas is to be expected. Until some standard, some method, can be devised which will rule out these individual predilections no finality can be reached. It is not that the search for such a measure has been neglected. Repeated attacks have been made on the subject, and each time the examining committee has fallen back on the clinical findings.

The question of the extent of "malnutrition," be the cause what it may, has given rise in recent times to great debate, much of it extraordinarily ill informed. One of the greatest of statisticians in this country, Mr. Udny Yule, speaking recently on the fall which had taken place in the death rate, said:

> "That such a change must mean a very great improvement in the condition of the poorer part of our population, which forms the great majority of it, seems to me obvious, and I think this cheering story deserves some special emphasis at present, when there is much talk, some of it sensible but some of it a bit lurid, and some of it—I think it is hardly too much to say—a little hysterical, on such matters as housing, unemployment, and nutrition. Some of it indeed is to me almost incredible, for if any large proportion of our population be as seriously undernourished as it is sometimes represented the existence of such low death rates becomes difficult to explain, and if unemployment were as grave a factor as is sometimes alleged it would be odd that unexampled unemployment should be accompanied by record low mortalities."

This comment receives support from the evidence collected by school medical officers, which, despite its variable quality, does not disclose the existence of much serious and widespread "malnutrition."

To my mind the comment of Mr. Udny Yule is just, timely, and proper. No one could be stupid enough to claim that all diets in this country are ideal when it is well known that many are faulty, but I do not believe they are so desperately bad as claimed by some writers. As Mendel said:

> "There is no field of practical importance related to human well-being in which there is greater opportunity for dogmatism and quackery, for pseudo-science and unwarranted prescrip-

* Sir Charles Hastings Lecture (abridged) given under the auspices of the British Medical Association in the McLellan Galleries, Glasgow, February 23, 1937.

tions and proscriptions, than in the domain of our daily diet."

The difficulty is that so many people think they are authorities on the subject of food and nutrition in general, and they do not hesitate to air their views, forgetting, or more often ignorant of, the number of problems, particularly quantitative ones, still unsolved. They forget, moreover, that in problems where the factors concerned are for the most part incapable of accurate measurement their knowledge about the subject must, as Kelvin pointed out long ago, be meagre and unsatisfactory. Under these conditions these would-be experts only too often darken counsel by words without knowledge.

Indices of Nutrition

As measures of the state of nutrition the indices commonly adopted are height and weight and the relation of these to age. Certainly both height and weight are capable of fairly accurate measurement. Weight as an index is, however, of very little value, as it is a well-recognized fact that the capacity to put on weight varies considerably with the temperament and particular constitution of the individual child or adult. The thin wiry child is, indeed, from the medical point of view fitter and more resistant on the whole than the fat overfed child. Weight may be due to big heavy bones, to much muscle, or to excess fat.

More emphasis has rightly been laid on the height factor. The stunted growth of the child which has been brought up in a faulty environment of whatever nature is a well-recognized phenomenon. There is no question that when such children are removed to a good environment the improved physique which results is remarkable. These are established facts. But recently there has been an active drive to transfer this possibility of improved physique from the particular to the general, the inference being that the bulk of the general population would respond in like manner. In his presidential address to the British Association last year Sir Josiah Stamp gave currency to the following statement:

> "It has been computed that a benevolent dictator could, at a relatively small expense, by applying our modern knowledge of diet, add some two inches to the average stature and seven or eight pounds to the average weight of the general population besides enormously increasing their resistance to disease."

I do not think anyone would question the ability of the so-called benevolent dictator to increase the body weight, but there might be a considerable measure of doubt as to whether all his efforts in the way of selected diet would add two inches to the average height and also increase enormously the resistance of the population to disease. I think it may be said it is generally believed that if it were possible to devise the perfect diet suited to the needs of each individual the resistance to disease might be increased so far as mortality is concerned but without much reduction in morbidity. Tuberculosis is the one disease to which there does seem to be fairly good evidence that a well-fed body is more resistant.

Rate of Growth, and Ultimate Stature

When we turn to the consideration of the possibility of increasing the average stature from a present average of approximately sixty-seven inches to sixty-nine inches the food supply of the benevolent dictator would have to contain some very stimulating ingredients, ingredients potent enough to defeat hereditary inertia. At the outset we must differentiate between rate of growth in the young and ultimate stature in the adult. Stature is not so subject to environmental influence as weight. It is much more static, it is an inborn character, determined more by heredity than environment. The hereditary influence has been stated to account for over 90 per cent. of stature. It is true there is a certain small amount of evidence to suggest that the Nordic races at least are gradually growing taller. Such deductions have in the main been drawn from the growth of both male and female students in certain American universities, yet, on the other hand, the authors of the volume on statistics relating to the great mass of recruits for the American Army in the late war are more cautious. They compared their data with the Army data of the Civil War some fifty years earlier, and found little apparent change in height, although there was a few pounds increase in weight. After due consideration of all the factors they inclined to the belief that the average stature in the United States had actually decreased by about one half-inch, due probably to the immigration of shorter races. The same view concerning the increase of height of the student class has been put forward in this country. Sir Arthur Keith holds, however, that "the evidence so far leads us to believe that our present stature and size of body are part of an ancient inheritance, one which has not been altered by the passage of hundreds or thousands of years." Yet the environmental changes, both as regards housing, hygiene (personal and public), the quantity and quality of food, during this long span of years are prodigious.

So far I have been speaking of the average ultimate stature of the adult. The evidence, I think, is plain that it is largely dominated by racial or hereditary characteristics which, if they can be altered at all, must be altered extraordinarily slowly. When, however, we turn to the consideration of the rate of growth in stature, the phenomenon characteristic of the young, we are faced with quite another problem. There is no doubt that a faulty diet may be a most potent agent in inhibiting growth in general. The experiments of Mendel and Osborne and many later workers are quite clear on this point. But the evidence is equally clear that this power to grow is only inhibited, not destroyed. The inhibition may even be of very long duration. The urge to grow in the young is as strong as life itself. Further, the capacity to reproduce is not lost when growth is inhibited nor is the capacity to provide milk suitable for the normal growth of the young despite the faulty diet consumed by the mother. The growth capacity of the young from such mothers is not affected, for if after weaning they are put on a suitable and adequate diet they grow at the normal rate. Moreover, it must be noted that all the evidence goes to show that although it is easy to inhibit increase in body weight by adverse environmental conditions it is difficult to check the persistent growth of skeletal structure.

Factors in Limitation of Growth

It is probably, one might almost venture to say certainly, true that one of the most potent factors in limiting the growth of children is either absolute lack of food or the consumption of food qualitatively inadequate. Still, if it be admitted that inadequate food is an important causal factor there are other factors, such as faulty housing, lack of exercise, lack of sleep, etc., which play contributory parts. For instance, some very interesting Glasgow data on the growth of school children have been put forward to show the apparent close relation between growth and the size of the house occupied by the parents.

It is possible to speed up the rate of growth in the underfed child both in height and weight; it is possible even to alleviate or cure malnutrition, but the height ultimately attained will be, in general, that predestined for the particular individual. As Deniker wrote:

"The primordial characteristics of race seem always to get the upper hand, and the modifications produced by environment can alter the stature of the race only within very restricted limits. The miners of a high stature like the Scots, for example, will be still taller than the individuals of the well-to-do classes in, for example, Spain or Italy, and much more so than those of Japan. Stature is truly, then, a character of race, and a very persistent one."

Food Not the Only Factor in Good Nutrition

My contention, then, is that without in any way detracting from the value of food as an all-important factor in good nutrition, it is impossible to accept food as the only factor. Food alone will never achieve the results claimed and apparently expected. Food intake, no matter how abundant and well selected, without, for example, exercise or adequate sleep, will not determine the state of good nutrition. It is relatively easy to develop eusitia (well-fed-ness), but a much more complex and intricate problem to develop eutrophia (good nutrition). It is probable that on the whole it is easier to make up early deficiencies of diet than deficiencies of physical culture in the broadest sense of the term.

I repeat, I do not desire to belittle the importance of food or to suggest for a moment that many of the diets in common use are beyond criticism. Unfortunately we have had ample evidence that many of the present-day diets leave much to be desired. Far too often it is stated, more often perhaps assumed, that the defective diets are solely the product of lack of means. It is common knowledge, knowledge confirmed for me at least by our dietary surveys, that frankly bad diets can be found in households not in the receipt of the lowest incomes. It would, on the other hand, be simply the height of folly to assert that income shortage is never to blame in whole or in part.

Diets and Budgets

The question is often asked why, if the needs of the organism be known, some body of experts does not sit down and work out the cost of such provision. If the assumption be made, and it is only an assumption, that we know (*a*) the fundamental needs of the human organism, and (*b*) the sources from which these needs may be completely satisfied, it would seem to most people to require but a simple sum in arithmetic to solve the problem of the relation of an adequate diet to the family budget. But unfortunately in practice the solution is neither easy nor simple. It is not how much money is spent on food but what is obtained with the money spent and how the purchases are used which counts. Academically it is perfectly easy to devise simple yet, so far as our knowledge goes, complete diets which will satisfy all needs at a relatively low cost, but, again unfortunately, the majority of human beings are not content, like many of the domesticated animals, to live day in day out on a monotonous diet. The difficulty is that the majority of mankind want and demand change and variety, a demand which in the end increases cost. There is, indeed, no hard-and-fast scientific solution of the practical problem. There are too many variables, and not the least of these are those which are associated with the likes and dislikes, the traditional beliefs, customs, and conventions of the consumer. It must not be forgotten that there is a definite psychological aspect to the problem of diet.

We have only to turn over the pages of the recent report of the International Institute of Agriculture to find evidence for the diversities which exist in dietary demand. If race A, which consumes 73 lb. of meat per head per year, is fit and healthy, is race B, which eats 236 lb. of meat per annum, overfed and pathological? Or is race C, which consumes 6.71 bushels of wheat per head per year, leading a physiological life when race D manages to get along on 2.5 bushels per head per year? Further, even within the limits of a single country like our own, for various reasons there is a very wide range in the prices of ordinary standard foodstuffs. For which consumption of meat or wheat, for which price level, are we expected to budget; and are we to budget for the good housewife and cook or the bad and careless one?

I am convinced that a mere increase in wages or allowances will not solve the question of defective diets. There is no guarantee that the extra money, if given, will be spent in a proper fashion. As Professor Forrester said in a recent address, when speaking on the relation between incomes of the relatively poor and prices,

"increase in purchasing power would only be partly spent in remedying deficiencies in dietary, since people would attempt to increase their satisfaction on all items in the standard of living and not merely on food. It would require some specific measure of public intervention to secure the whole of the increase for food expenditure."

Moreover, even if it were all spent on food, there would be no guarantee that the proper materials would be purchased and utilized to the best advantage. The solution, where immediate action is required, would be the provision of cooked meals, as is done in schools. But this is no permanent solution. Although I do not believe that the average working-class housewife merits the damning indictment of the Frenchman Siegfried, in his book *England's Crisis*, it is probably true that as compared with the average Frenchwoman of her class she does not have their "sense of or delight in economy." "Do not imagine," he concluded, "that the French workman, though he receives less than half as much money [as the English workman] lives only half as well."

The Need for Education

Improved education on what can be done in the way of dietary is badly required—education in budgeting, marketing, and cooking. Too often it is assumed these are easy arts to practise, that every woman receives them as inborn gifts. On the contrary, they are difficult arts, only to be acquired by patience and time. The education must be such that it is suited to the needs, skill, and intelligence of those who require assistance; and, as the experience of such institutions as welfare centres clearly shows, the majority of the mothers are eager and willing to be taught. We are not an imaginative people where food is concerned, and the food shopping list is very limited. Many of the really valuable foodstuffs are neglected. If it be well to include in the diet a good supply of first-class proteins why is greater use not made of fish? Why is herring, one of the most excellent of protective foods, relatively neglected? Why is more use not made of cheese, of liquid skim-milk where available, or of dried skim-milk? Much of the modern cereal foodstuffs could with great advantage be replaced by potatoes, which provide vitamins B and C, iron, and readily available calcium and phosphorus. The British Medical Association has made an excellent start with the recent publication of its small book, *Family Meals and Catering*.

Concluding Remarks

In conclusion I should just like to say a word regarding those who do not require to consider every penny spent on food. Faulty dieting is not uncommon among this class, where appetite is, as a rule, the sole dictator of intake. It is true that certain workers have stressed following the dictates of appetite, but it is very difficult to say whether this is always a sound line or no in the human being. There is ample evidence that it is an effective guide in the case of certain animals like pigs, dogs, and rats, which are not pampered and are given a free choice in the selection of their food. There is no question about the fact that apparently perfectly normal human beings exhibit wide variances in their food preferences, based often, I believe, on real but probably more often on imaginary needs. Again I emphasize the point that in this question of food the problem is frequently as much psychological as physiological. "Better a dinner of herbs, where love is, than a stalled ox and hatred therewith" is very sound doctrine. The great danger is that people develop a pathological interest in food, that they become food-conscious due to the superfluity of ill-advised chit-chat concerning the virtues or evils of this or that article of diet. It is infinitely more profitable to follow the advice,

> "Eat all kind Nature doth bestow;
> It will amalgamate below
> If the mind says it shall be so.
> But if you once begin to doubt
> The gastric juice will find it out."

THE "DISPOSITION" AND THE SPECIFIC ALLERGEN IN ASTHMA, HAY FEVER, AND OTHER ALLERGIC CONDITIONS

BY

E. M. FRAENKEL, M.D.

The phrase "allergic disease" means no more as a diagnosis than the terms "infectious disease" and "metabolic disease." Three alterations in the normal behaviour of the tissues are considered to be characteristic of allergic conditions and reactions. The most striking of these is the constriction of the smooth muscles, such as takes place in the bronchial spasm of asthma, in the spasm of the bowel in spastic colitis, or in the vascular spasm that is presumed to take place in migraine. The second alteration is a localized exudative increase in the water content of certain tissues, such as occurs in the skin in Quincke's oedema and in the mucous membranes in rhinitis and other catarrhal conditions. The third alteration that is often present is a generalized or localized increase in the eosinophils. In most cases a combination of all three of these conditions is characteristic.

The Allergic Reaction

This type of so-called "allergic reaction," particularly the constriction of the smooth muscle fibres, is an effect that can be produced by irritation of the parasympathetic nervous system. It is therefore conceivable that anything and everything causing such an irritation would result in the same complex of symptoms and that everything capable of counteracting this irritation could be used as a therapeutic or prophylactic agent. The parasympathetic irritation might be due to a reflex action from a special area. An abnormally high irritability of an area, as in the conjunctivae and the nasal, bronchial, and intestinal mucous membranes, might therefore be responsible for the onset of reactions induced by irritants harmless to less sensitive parts or persons. On the other hand, it shows that the hypersensitivity towards irritation at one spot does not usually mean that there exists a general hypersensitivity of all tissues of the body, and it is in this way that the localization of the irritability may be produced.

The irritability of the parasympathetic nervous system, however, depends on such general metabolic factors as the balance of potassium and calcium salts in the mineral content of the tissues. The calcium acts as a stabilizing factor; in a similar way other metabolic factors may act as sympathetic or parasympathetic irritants, and others may prevent this irritation. For example, such endocrine products as pituitrin and adrenaline counteract the irritation of the parasympathetic by counter-irritation of the sympathetic, whereas a drug like atropine protects the parasympathetic from irritation. It may thus be understood that the constitutional behaviour of different types of patients at different periods of life—as at puberty and during the menopause—or while subject to endocrine disturbance, can so alter their irritability that they become hypersensitive towards otherwise innocuous irritants. The regulation of the sympathetic nervous system by the higher centres and by psychic factors may work in both directions, causing either an increase or a decrease in the irritability. Cures brought about by suggestion therapy cannot therefore be used as proof of the psychological origin of the irritability.

Disposition Towards Allergic Irritation

Irritability of the sympathetic nervous system cannot be neglected in the investigation and treatment of allergic patients. It is the variation in the conditions mentioned above that we may call the disposition of the patient towards specific allergens. A change in both local and general irritability may be brought about by a variety of factors. To these is added the factor of the external irritant, the so-called allergen. A number of allergens are so powerful that they produce an allergic condition in all persons exposed to their action. These are followed by a number ranging in potency down to those so weak that they give rise to symptoms in only a few particularly susceptible persons. Hay-fever pollen, for example, affects about 1 per cent. of the population of large towns, whereas it has been found in Switzerland that the country people are affected only to the extent of about 0.2 per cent. of the population. This shows clearly that the same allergen has a different effect upon a population under different conditions, and that the disposition plays a definite part in allergic diseases.

The mechanism of an allergic reaction is probably similar to that of an anaphylactic shock or to that of parasympathetic irritation in general. It has been shown by Dale and others that both anaphylactic shock and nervous irritation are either followed or caused by the formation of acetylcholine in the tissues, acting in a similar way to histamine in causing contraction of the smooth muscles. It is not yet quite clear whether these or similar compounds can be split off from the supposed allergen, or whether, in the case of allergic reactions, they are produced by the cells of the subject under the influence of a specific parasympathetic irritation.

Theoretically any type of irritation, physical or chemical, acting in conjunction with the factors described above, could give rise to any one of the reactions known as allergic. In point of fact the well-defined allergens

are usually thought to be of the nature of proteins, and with such chemical substances as "ursol," salicylic acid, and pyramidon it is believed that a compound of these and of the proteins of the body has been formed and endowed with allergic properties. The mechanism of such a reaction will be understood when I refer to Landsteiner's allergens, where a compound of such chemical substances as benzyl chloride with various proteins was effected. These compounds produced group-specific antibodies and reactions towards the chemical substance in question, and not towards the protein.

The Specific Allergen

The specific allergen is well known in hay fever and the asthma occurring in furriers, as well as in certain other cases. It is also recognized in the urticaria produced by foodstuffs—for example, strawberries and crayfish—or by primula. These examples show that there exists a very wide range of substances that can act as allergens. The allergen can enter the body by means of inhalation, as in hay fever and in furrier's asthma. Such air-borne allergens are a very common cause of allergic conditions. The allergen may enter the body in the form of a foodstuff in urticaria and in the eczema of babies who are given unsuitable food. Foodstuffs may also provoke an attack of asthma or of mucous colitis.

The entrance of allergens through the skin is known to occur in many eczemas of occupational origin, and an example of the subcutaneous mode of entrance is afforded by the "serum sickness" that sometimes ensues from treatment with horse serum. These examples demonstrate another important fact—namely, that the site of entrance of the allergen is not identical with the organ in which the symptoms are manifested. A parenteral injection may give rise in the skin to urticaria or Quincke's oedema, in the bowels to colitis, or in the respiratory tract to asthma or to rhinitis; the same is true of other modes of entrance of the allergen.

Experience has shown that an allergic reaction is from the beginning as specific as any other immunity reaction. The allergy usually begins with a hypersensitivity towards one or two well-defined allergens (monovalency). Gradually, however, if the condition does not receive proper treatment, the body becomes more and more sensitive towards other allergens (polyvalency). It is to be recommended that in these cases the threshold of sensitivity be raised rather than an attempt be made to remove any allergen in particular. This can, of course, be accomplished by the treatment of constitutional factors as well as by desensitization.

In other cases, however, the role of the specific allergen is predominant, and the detection of this and the subsequent protection from or immunization against it constitute the only satisfactory method of treatment. There are allergens which, in a similar way to a universally pathogenic micro-organism, result in allergic symptoms in all who come under their influence. An example of this was afforded by Frugoni and Ancona, who found that peasants suffered from asthma after working in fields infected with a certain species of tinea, and there is also the example of the purified allergen produced by Bloch and his collaborators from primula which provoked urticaria in everybody who received an injection of it.

Many attempts have been made to isolate the responsible chemical compounds from the various allergens. It is, for instance, considered probable that in hay fever carbohydrates of a similar structure to the antigenic carbohydrates existing in bacteria are responsible. We have, on the other hand, some experimental evidence, obtained from the use of masks equipped with filtration apparatus, that in epidermal allergens such as feathers it is probable that they are more of the nature of an essential oil or of a protein in such a fine state of subdivision that it is dissolved with facility in the microdroplets of water present in the atmosphere.

TWO EXAMPLES

The specificity of the allergen may be illustrated by two cases.

A young lady, recently married, had before marriage suffered from asthma when living in her parents' house, but had been free when living in a boarding house in town. After her marriage she invariably suffered from attacks of asthma at night. As an extract of feathers produced a positive skin reaction she was sent to a sanatorium, where she was advised to sleep on bedding free from feathers, and here she was entirely free from any symptoms. Subsequently, while travelling, she often slept on feather beds in hotels, but never suffered from any attacks. On her return home she slept once more on her own feather bed, and the asthma immediately returned. Extracts from the feathers in her bedding gave a very strong skin reaction, and she admitted that her bedding had been brought from her parents' home. On my advice she disposed of the bedding in question, not without first getting a violent attack after beating and cleaning it. It is probable that some contaminating substance was present in these particular feathers, and it was this substance that produced the marked specificity.

Another lady suffered from severe attacks in Königsberg, but was completely free in Berlin. It was possible to show that the inhalation of the street dust of Königsberg was responsible for the asthma, and positive skin tests were obtained with extracts of this dust, whereas no such results were obtained with the street dust from Berlin.

These two examples show that such substances as dust and feathers are in reality very complicated mixtures of a large number of individual substances, and are not comparable with a specific allergen from a definite mould, bacterium, or grass pollen.

Diagnostic Methods

The only real proof that a particular allergen causes the allergic condition is the production of this in the patient after exposure to the allergen and the cure of the condition subsequent to its removal. Such an experiment is, of course, disagreeable for the patient, and, although the attack can be controlled by the judicious use of adrenaline, involves a certain degree of risk. Nevertheless the "exposure test" and the "removal test" are the diagnostic aids that finally decide the specificity of the causal allergen. The first may be used with appropriate caution in a clinical institution, where every aid is at hand should it be necessary to deal with an unwanted reaction. The second may be safely used in private practice. In private practice, however, the most important diagnostic features are the history of the patient and of his family regarding allergic complaints and their relation to factors in their surroundings, both professional and domestic. These diagnostic features also include an eosinophilia of the blood and of the excreta, including both sputum and stools, and the production of skin reactions with extracts of alleged allergens.

With the "exposure test" I have been able to determine the exact mode of entrance of the air-borne allergen by means of a mask that afforded protection to the conjunctivae, the nasal mucous membrane, or the mouth, or to any combination of these. It was already known that the protection of the conjunctivae by goggles would prevent the onset of rhinitis and asthma in some hay-fever patients.

Illustrative Cases

In one of my patients who had a hypersensitivity towards dog's hair a mask protecting the conjunctivae and nose alone, with the mouth unprotected, prevented the onset of an attack of asthma. I was able to prove in the same case that the protection afforded by filtration apparatus and a mask was only of use so long as the filter remained in operation. As soon as the filter was replaced by a dummy, exposure to dog's hair was followed by an immediate attack of asthma. This result being obtained in a patient who believed herself to be protected is a proof that the asthma was actually produced by the allergen and that no protection was afforded by a mere psychological factor. There are, however, only a small number of patients in whom the intake of an allergen is immediately followed by the production of obvious allergic symptoms.

Another patient, who had observed that his attacks always occurred after eating a certain variety of peas, had an attack in hospital after eating such peas, and at the same time gave a tremendous skin reaction on being injected with a small quantity of pea extract. Such specific cases are rare but characteristic, and they afford a reliable proof of the specific role of the allergen.

In another patient the history suggested that the onset of his attacks dated from the time he began work as a furrier. The skin tests in the case showed, however, that he had a marked hypersensitivity towards bed feathers, and his condition was immediately cured by removal of feathers from his bedding.

Although the history was misleading in this instance I still believe that in most cases, especially where skin tests give inconclusive results, it is of the greatest importance to employ the history as a guide in the choice of allergens that should be used in testing and for the interpretation of the results. A positive skin test, whether obtained by the cutaneous or intracutaneous method, should exhibit a marked wheal with a surrounding inflammatory zone which may be as large as a halfpenny or even larger, and which may or may not be accompanied by other distant or general allergic symptoms. Where specific reactions are expected, as in hay fever, it is desirable that only the cutaneous method of skin testing should be used in order to avoid disagreeable symptoms.

I have recently shown that the area of a reaction becomes, for the few hours following its appearance, insensitive to the injection of other allergens, but not to that of a solution of peptone. I would hesitate, however, to conclude from these observations that in all these allergens the same substance is responsible for the reaction. This has been said of the hay-fever allergens derived from many types of pollen, and it has for this reason been maintained that it is sufficient to carry out desensitization with only one or, at most, a few pollens, and that this technique gives the same results as the use of individual extracts. My own experience, however, does not support this conclusion, as the following case shows.

A boy, aged 15 years, had suffered from a "status asthmaticus" from 1931 to 1933 in all parts of Europe, both in low-lying country and in the mountains. Skin tests showed him to be hypersensitive towards *Festuca rubra, Dactylis glomerata, Lolium perenne, Cecale cereale, Triticum vulgare, Trisetum floresce, Agrostis canina,* and *Elymus gigantes.* After a course of injections in 1934 he had a few attacks of rhinitis, but no asthma during the hay-fever season of that year. During the next year the three last allergens were found no longer to give skin reactions, and reactions to all the others, except *Festuca rubra* and *Cecale cereale,* were diminished. A fresh course of injections with a new mixture which included Timothy grass (*Phleum pratense*)—although this was negative in skin tests—and *Alopecurus pratensis* was given, and, although 1935 was a particularly bad season for hay-fever sufferers, complete freedom has been enjoyed during the subsequent two years.

Most allergic patients do not show the markedly specific reactions obtained in hay fever, and tend to react with an assortment of allergens. In such, comparison with a carbol-saline control and the comparison of the various tests, together with the history of the patient, gives a certain guide in the judgement of the tests. But these reactions cannot be considered to be as reliable as the marked reactions mentioned above, and much experience and judgement is necessary for their correct interpretation. It must be remembered that bacterial allergens usually produce reactions after much longer intervals (up to as long as twenty-four hours), which can perhaps be explained as being due to the same mechanism as that responsible for Shwartzmann's phenomenon or to a similar one.

Another specific test that is perhaps too complicated to be employed for general purposes is the Prausnitz-Kuestner reaction, in which the passive transmission of the hypersensitivity from an allergic patient to a normal person is secured by means of an injection of the affected person's blood serum. The hypersensitivity, which is purely local, occurs at the site of the injection after a few hours. In some instances eosinophilia was of use in diagnosis, as in nearly 50 per cent. of the allergic cases there is an eosinophilia of the blood of over 5 per cent., and in one of my asthma cases the eosinophilia was as high as 53 per cent.

Clinical Experience

Up to the present time my experience comprises about 800 allergic cases: 200 of these were observed a few years ago in the Charité Hospital in Berlin, and the remaining 600 in private practice and at certain other hospitals. Most of these cases were asthmatic, but a part of them were cases of hay fever and other allergic diseases, including vasomotor rhinitis, Quincke's oedema, urticaria, migraine, and mucous colitis. In a survey of 522 asthma cases published in 1934 I found allergic symptoms such as an eosinophilia of over 4 per cent. in 221 cases, a family history of allergy in 128, and other allergic symptoms besides asthma in 165. Positive skin tests were obtained in 364. Among the most frequent reactions were those obtained with house dust, which gave 252 positive results. Feather beds and mattresses gave 199 positive results, and eighty-four were obtained with extracts of moulds cultured from allergic surroundings. Bacterial extracts gave positive results in 108 cases, animal fur in forty-two, and other allergens in fifty-five. The majority of cases gave positive results with more than one allergen.

In a previous paper in this *Journal* I discussed the part played by active and inactive tuberculosis in the course of allergic complaints. The role of infections in general and of tuberculosis in particular may be the same as that of any other sensitization, this being produced by the protein of the infecting organism. It may, however, prepare a special part of the body, such as the bronchial mucous membrane, and in tuberculosis the lymphatics and/or the lung tissue, or streptococcal infections the antrum, so that their threshold is lowered towards the entrance of other allergens. On the other hand, I have observed that cases of inactive tuberculous infection have flared up subsequent to or because of desensitization with other allergens. I have also drawn attention to some patients who, with all the symptoms of a true bronchial asthma, prove to have active and open tuberculosis. For this reason it is, in my opinion, essential to examine the sputum for tubercle bacilli and to perform an *x*-ray examination of the chest as a routine in all asthma cases. In this way diagnostic errors, such as the overlooking of a bronchiectatic condition of the lung, substernal goitre, and other diseases will be avoided. *X*-ray examination of the nasal sinuses

seems to be of particular importance not only in asthma but more especially in vasomotor rhinitis, and old foci in the antrum may be responsible for the exacerbation of symptoms in operations on the nose.

Treatment and Prophylaxis

It is clear that treatment of allergic conditions, especially of asthma, can and must start from several different aspects. When the specific allergen is the outstanding factor the discovery and removal of it may be followed by complete recovery. It may be very easy in one case and impossible in another.

As the complete range of allergens that are responsible can rarely be discovered in any one case, I make use of those specific allergens that have been detected mixed together with either peptone or small quantities of old tuberculin. Such a mixture is of great use in the treatment of a case in which any doubt remains as to the identity of all the responsible allergens. The treatment begins with a dose of a dilution that has been found, by means of titration in skin tests, to be considerably smaller than the smallest quantity producing a skin reaction. The course of injections, covering a period of ten to twelve weeks, should consist of doses of increasing size, and

The mask type of allergen-filtration apparatus connected to a high-pressure air supply in horiontal pipe behind chairs.

should not in any way be interrupted. Should, as the doses are increased, a severe reaction occur, the addition of 0.25 c.cm. of adrenaline 1 in 1,000 and/or the reduction of the quantity of the next dose to that of the preceding one will in most cases allow treatment to be continued. I have always tried to begin treatment in allergen-free surroundings. For hay fever it is usual to begin and finish the treatment before the start of the hay-fever season. With house allergens such surroundings may be obtained by means of an allergen-filter apparatus (see figure)—mask, sleeping bag, or cubicle—or by the careful removal of feathers and dust. In instances of food allergy the necessary conditions are obtainable by means of a special diet.

As has been shown before, the majority of cases in adults as well as in children are due to a hypersensitivity towards house allergens. Those next most responsible are the bacterial allergens, and I think it is for this reason that some asthma patients respond to vaccine treatment. The efficacy of such treatment depends very largely on the choice of the correct dose, on the type of bacterial vaccine, and on the time interval and the length of treatment. I prefer to use autogenous bacterial "allergens" until the patient has acquired a high degree of desensitization and consequent immunity.

Summary

The "threshold towards the allergen" varies not only in different persons but in the same person at different periods of life and under different conditions.

Hypersensitivity is consequently a variable factor not only in general but also in particular localized areas.

Thirdly, one has in these conditions to deal with a variety of causes changing the threshold of hypersensitivity. Treatment consists in dealing with septic foci, endocrine and metabolic changes, special physical conditions of the upper respiratory tract and chest wall, and with psychological factors influencing the sympathetic nervous system.

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POST-HYSTERECTOMY AND PUERPERAL TETANUS

A STUDY OF THE BACTERIOLOGY OF OBSTETRICAL AND GYNAECOLOGICAL DRESSINGS *

BY

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The experiments related in this paper were undertaken to discover why a specific case of tetanus developed after hysterectomy, and they were extended to establish the reason why post-operative tetanus is peculiarly related to hysterectomy. It was apparent as a result that the dressings used before the operation contained tetanus spores and other anaerobic spore-bearing pathogens; they were made of "cellulose wadding."

Study of a Case

The clinical features of the case were as follows.

A woman of 51 suffered from intermittent loss of blood per vaginam. At operation an endometrioma of the posterior uterine wall was found attached to the pelvic colon. Total hysterectomy and bilateral salpingo-oophorectomy were performed. Four days later "tonsillitis" developed; and seven days later trismus, with spasms on deglutition. A diagnosis of tetanus was made by two clinicians experienced in the condition. She died twelve days after the operation.

At the post-mortem examination the operation site was found in fair condition, although less union of tissue was present than normal; there was no definite naked-eye sepsis. The spleen was soft and diffluent, little evidence of tonsillitis was found, and nothing explaining death.

Material from the wound site was collected, and also a sample of faeces. The tissue cultures yielded morphologically typical tetanus bacilli and spores; the faeces did not. A guinea-pig injected with a mixed culture died with signs of tetanus.

The catgut used at the operation had also been used on the same day on two other cases, which had a normal con-

* From the John Burford Carlill Laboratories, Westminster Hospital Medical School.

valescence. A sample was tested and gave no aerobic or anaerobic growth. It was reissued for general use, and the whole batch, a large one, was used over a period of months with no untoward results.

Attention was then directed to the dressings. After operation the vulval pads used were made of cotton-wool, autoclaved according to a routine found satisfactory by test. No organisms were found in sampling a typical dressing tin. Before operation, however, a pad of unsterilized cellulose wadding had been used. A specimen was taken and placed in a wide-mouthed jar, boiling broth was poured on to it, and the culture was examined after seventy-two hours. Morphologically typical tetanus bacilli were found; the culture was purified by subculture, and on injection into mice typical tetanus developed.

The position, therefore, was that a woman not harbouring tetanus spores in her faeces developed tetanus after an operation in which catgut was almost certainly not to blame, and that the pads employed prior to operation were conclusively shown to contain tetanus spores. It would scarcely be possible to obtain a better *a priori* case for the aetiology of this particular tragedy.

Consideration of the Literature

An admirable account of the literature of catgut tetanus is given by Dalrymple-Champneys. The difficulty of proving a chain of events which had their origin some days or weeks back is obvious; the specific catgut used is rarely if ever obtainable, and it is not surprising that proof of the contamination is rarely to hand. Although the material used is made from the relatively sterile small intestines of lambs, it is obviously a possible cause of post-operative tetanus. But there are a very large number of other possible sources; tetanus spores are everywhere. There are, indeed, strong reasons to suppose that post-operative tetanus is due most often to causes other than catgut.

In the first place, if catgut were to blame as a rule we should expect a general operative incidence, or perhaps an incidence varying only with the amount of catgut used. But, broadly considered, tetanus is found to follow minor operations where no catgut is used more often than major operations involving much catgut. Such conditions as tetanus neonatorum, due to the knife used, tetanus following vaccination and corn-cutting, due to the dressings, and a series recently reported by Godwin where several cases after circumcision were found to be due to dressings applied by a Cypriot quack, indicate that it is unreasonable to blame catgut, in whose preparation at least some care is taken, rather than dressings and apparatus, in whose preparation far less care is taken.

The observation that post-operative tetanus has a peculiar incidence following hysterectomy was made by Fildes, who stressed the difficulty of proving a relationship between the catgut used and the infection. He quoted cases recorded by Koch, Audebert, and Dyke. Four further cases have been reported to me privately.

Apart from cases following hysterectomy a large number of cases after abortion, either criminal or natural, and after childbirth are recorded. Le Doze collected nineteen cases of puerperal tetanus, and stated that puerperal tetanus accounted for 3.5 per cent. of all cases of tetanus. The literature of tetanus has recently abounded in references to this condition; cases have, for example, been recorded by Rossi and Bernardbeig. Moreover, the female genital tract is a possible source of contamination in tetanus neonatorum; and the case of tetanus developing after rupture of prepuce in coitus recorded by Kuzmin may perhaps have been of similar aetiology. The importance of the condition in obstetrical and gynaecological practice must not, however, be exaggerated. Reference to the literature indicates its development after compound fractures, where the dressings or direct wound contamination by dirt may be the cause, after operations on the gut, where the organism is possibly derived from the faeces, and after extraction of teeth. In the case of dental extractions, again, the possibility of infection from the plug inserted into the socket must not be overlooked, although tetanus bacilli have been grown from saliva. Enough has, however, been said to show that tetanus is a disease sooner or later likely to bring itself to the attention of gynaecologists and obstetricians, and that any explanation of its development in such practice deserves consideration on its merits.

Tetanus Spores in Cellulose Wadding

The discovery of the unsuspected presence of tetanus spores in cellulose wadding dressings was made by Fildes; and two cases developing in orthopaedic practice from splints packed with this were described by him at a meeting of the Pathological Section of the Royal Society of Medicine in 1935. The cases were not published. The technique used by him makes the isolation of tetanus, previously difficult, exceedingly simple. Cellulose wadding produces a "reduction potential" which makes anaerobic culture easy without further elaboration, and the climbing properties on agar slopes of the organism render purification again a simple matter. No other anaerobe is so easily obtained pure.

In view of the apparent relationship of the case here described to "sanitary towels," a number of different types of British make were examined. They were made of bleached or unbleached, coloured or non-coloured, cellulose wadding, or of cotton-wool, or of mixtures of both. Some were advertised as hygienic, aseptic, or antiseptic. No British towel is actually sold with a guarantee of sterility, though some have a vague certificate.

It is difficult for the pathologist to see any difference of importance between the various makes, though of course the wearer may find preferences.

Results of Cultures

The results of anaerobic cultures are tabulated below. It will be seen that *Cl. tetani* and *Cl. welchii* are consistently present, and that in some cases death from tetanus followed in mice injected. In many cases mild tetanus developed, but the mice recovered.

No.	Composition of Towel	Description of Towel	Anaerobic Bacteria	Litmus Milk	Mice Tests
1	White cellulose wool; white cotton-wool	Nil	Cl. tetani Cl. welchii Cl. sporogenes	Acid Storm clot	Negative
2	White cellulose wool; coloured cellulose wool	Nil	Cl. tetani Cl. welchii Cl. sporogenes	Acid Storm clot	Positive
3	White cellulose wool	Certificate of Hygiene	Cl. tetani Cl. welchii Cl. sporogenes	Acid Storm clot	Positive
4	White cellulose wool	Nil	Cl. tetani Cl. sporogenes	Acid	Negative
5	White cellulose wool	Nil	Cl. tetani Cl. welchii Cl. sporogenes	Acid Storm clot	Negative
6	White cellulose wool	Certificate of Hygiene	Cl. tetani Cl. sporogenes	Acid	Positive
10	Brown and white cellulose wool; white cotton-wool	Nil	Cl. tetani Cl. welchii Cl. sporogenes	Acid Storm clot	Slight spasm. Negative
11	Brown and white cotton-wool	Nil	Cl. tetani Cl. welchii Cl. sporogenes	Acid Storm clot	Negative
12	White cellulose wool; white cotton-wool	Nil	Cl. welchii Cl. sporogenes	Acid Storm clot	Negative
13	White cotton-wool	Antiseptic, recommended by medical profession	Cl. welchii Cl. sporogenes	Acid Storm clot	Negative
14	White cellulose wool; brown and white cotton-wool	Antiseptic	Cl. welchii Cl. sporogenes	Acid Storm clot	Negative

Aerobic cultures were then made on the same products; a much more difficult task, since spreading air organisms were constantly present. Results may be again tabulated, haemolytic staphylococci, non-haemolytic streptococci, and *B. coli* were identified.

No.	Description of Towel	Aerobic Bacteria	B. Coli Test
1	Nil	Haemolytic staphylococci Coliform bacilli	Positive
2	Nil	Staphylococci Streptococci	Negative
3	Certificate of Hygiene	Staphylococci Streptococci	Negative
4	Nil	Staphylococci	Negative
5	Nil	Coliform bacilli Pneumococci	Positive
6	Certificate of Hygiene	Haemolytic staphylococci Coliform bacilli	Positive
10	Nil	Streptococci, Coliform bacilli, B. subtilis	Positive
11	Nil	Staphylococci Coliform bacilli	Positive
12	Nil	Haemolytic staphylococci Coliform bacilli	Negative
13	Antiseptic, recommended by medical profession	Haemolytic staphylococci Coliform bacilli	Negative
14	Antiseptic	Staphylococci, Coliform bacilli, B. subtilis	Positive

In France several brands of towel are sold with vague certificates of sterility; one type was found with a clearly phrased guarantee specifying the autoclave temperature. The results of cultures were as follows:

No.	Composition of Towel	Description of Towel	Anaerobic Bacteria	Litmus Milk	Mice Tests
7	White cotton-wool	Aseptic and Antiseptic	Cl. welchii	Acid stormclot	Slight spasm. Negative
8	White cellulose wool Coloured "	Aseptic	Cl. tetani Cl. sporogenes	Acid	Negative
9	White cotton-wool	Aseptic and Antiseptic Sterilized 130° C.	Cl. tetani Cl. welchii	Acid stormclot	Negative

No.	Aerobic Bacteria	B. Coli Test
7	Coliform bacilli	Positive
8	Haemolytic staphylococci	Negative
9	Coliform bacilli, B. subtilis	Negative

In America greater importance is attached to sterility of towels, and one at least is sold with a specific guarantee of sterility. It is a tampon of white cotton-wool which lies in the vagina. It was the only towel examined which proved sterile. No "towel" of this vaginal type is sold in Great Britain, though, of course, dancers among others use such methods of absorbing menstrual flow.

No.	Composition of Towel	Description	Anaerobic Bacteria	Litmus Milk
16	White cotton-wool	American. Nil	Nil	Sterile
			Aerobic Bacteria	B. Coli Test
16	"	"	Nil	Negative

An accouchement set put up by a reputable maker was next examined. It was, of course, sold as sterile. The superficial wool was charred, suggesting that dry heat was used for sterilization. Results were as follows. The anaerobic staphylococci may be neglected; they were probably introduced during culture.

"Sterile" Accouchement Set

No.	Composition of Material	Description of Material	Anaerobic Cultures	Litmus Milk	Mice Tests
X	Brown and white cotton-wool towel	Sterile	Cl. tetani Cl. sporogenes	Acid	Slight spasm.
Y	Brown cotton-wool	"	Staphylococci B. subtilis	No change	Negative
Z	White cotton-wool	"	Staphylococci B. subtilis	No change	Negative

			Aerobic Cultures	B. Coli Tests
X	Ditto	"	Sterile	Negative
Y	Ditto	"	S. subtilis	Negative
Z	Ditto	"	Sterile	Negative

An accouchement set was next arbitrarily selected from the labour ward of a general hospital. The vulval pads were made of cellulose wadding. When cultured they were found sterile.

A similar set sold by a private firm and issued under strict supervision and regular bacteriological test by an enlightened medical officer of health in London was next examined. It had a closely fitting lid, which is often not the case. All the pads were made of cotton-wool. Three out of four were sterile. *B. subtilis* was obtained in one case, almost certainly a cultural contamination. The practice of this medical officer of health appears not to be universal; in some districts at least no control or supervision of accouchement sets exists.

It would appear from these findings that cellulose wadding is peculiarly apt, as Fildes showed, to harbour anaerobic spores. The reason is not obvious, since cotton-wool also consists of cellulose.

The method of manufacture of cellulose wadding is as follows:

1. Selected tree trunks, mainly red spruce and pine, are mechanically ground into chippings and then heated under pressure in an autoclave at a temperature of above 100° C. with a strong aqueous solution of sodium hydrogen sulphite containing an excess of sulphur dioxide. This treatment converts the lignin into lignone sulphonic acid, which, being soluble in water, is removed by washing, leaving behind the pure cellulose. The latter is then suspended in water, bleached with strong calcium hypochlorite solution, and then run out on a machine and converted into fairly thick boards.

2. The sulphite wood pulp is taken as required, macerated with water in a beating engine until it disintegrates into its constituent fibres, and then treated again with calcium or sodium hypochlorite solution. The pulp is then diluted with water and run on to a machine, where it is made into plied wadding.

These processes would be calculated to kill any spores, and in fact material after stage 1 and stage 2 was found free from *Cl. tetani* and *Cl. welchii* by bacteriological tests. The contamination therefore follows later.

Measurement of the electrical charge and rate of leak by a Lindeman electrometer did not show a material difference between cotton-wool and cellulose wadding; nor does either of them attract lycopodium when rubbed with vulcanite or other rods. A sterilized pad hung up in a room for seven days was not found on later culture

to contain either *Cl. tetani* or *Cl. welchii*, whether its composition was cellulose wadding or cotton-wool. However, cellulose wadding is known to have characteristics which make it peculiarly useful in industry; it is used in filtering solutions in artificial silk manufacture, and in gas masks, where cotton-wool is much inferior. The characteristics which make it of value in industry render its use, unsterilized, dangerous in medicine.

Discussion of Results

There is a danger that results such as those here described may be given grossly exaggerated importance. Tetanus spores are everywhere; and in this work such things as artificial and real silk handkerchiefs were found to contain them. It is not the presence of the spores but the use which is made of the products containing them which matters. No one has ever contracted or is ever likely to contract tetanus during the use in menstruation of these towels. Equally obviously, they should not be used before or after parturition or pelvic operations, even if they have been "sterilized."

Certain considerations, however, present themselves to a pathologist who studies for the first time the apparently neglected subject of the "hygiene of menstruation," and the "accouchement set." Sanitary towels are a recent development of civilization. They are not towels; are they sanitary? Is it really desirable to retain the menstrual flow at the vulva, particularly in pads apparently selectively impregnated with most of the better-known anaerobic and aerobic pathogens? Does this increase the "carrier rate" of the individual; and even if tetanus is a curiosity in the puerperium or after operation, is *welchii* infection so rare? Can women become carriers of virulent streptococci from this source, especially since so many women wear pads during pregnancy? Is the American technique of the sterile vaginal tampon preferable, whatever its aesthetic or other objections?

Moreover, it certainly seems strange that in these days of extreme care in the management of the puerperium no regulations exist for the sterilization or control of accouchement sets. A patient who contracts a *welchii* infection will get a serum which must comply with elaborate regulations; but the dressing which gave her the infection need comply with none. Yet the necessary regulations are few: autoclaving and occasional bacteriological testing are all that is needed. At present the sale of a tin of sardines is the subject of more official control than a tin of accouchement dressings. All the resources of preventive medicine are making little impression on the incidence of puerperal infection. The aboriginal, who uses no menstrual pad and no accouchement dressing tin, is safer from infection than her civilized sister.

It is not intended to exaggerate the importance of these views; there are unfortunately only too many known ways in which infection may occur in pregnancy. It is just possible, however, that changes in the hygiene of menstruation and more care in sterilization of dressings might be of benefit.

Technique of Examination

The bacteriological examination of a large object such as a vulval pad presents many difficulties. Spore-bearing organisms are, of course, very numerous in the air, and are apt to adhere to the pad during manipulation. Moreover, where wide-mouthed jars are used in culture, spores may drop in during manipulation, or might even survive in a cotton-wool plug after autoclaving. Control tests were therefore done with pads known to contain tetanus spores, and pads were autoclaved, impregnated with *Cl. sporogenes*, which has a typical morphology, and again autoclaved and then cultured. To avoid the risk of contamination from unsafe plugs the culture jars were fitted with screw caps.

These preliminary control tests showed that autoclaving for fifteen minutes at 130° C. killed *Cl. tetani* and *Cl. sporogenes* in vulval pads.

Such objects as the bristles of test-tube brushes used in the laboratory and the dust of the laboratory floor were found to contain tetanus spores. A rigid technique involving the minimum of manipulation was therefore followed. In no case were any pathogenic spore-bearing organisms found in material sterilized in the laboratories or the theatre sterilizer of Westminster Hospital.

On the other hand *B. subtilis* grew, usually after a lapse of some days, in about one control test in four, and occasionally *Staphylococcus albus* was grown. The laboratory air, filtered through powdered sugar, was found to contain these organisms. Even when manipulations are performed behind a glass screen complete sterility is difficult to ensure.

It is wise, therefore, to examine at least four pads from a dressing tin, and to neglect an occasional contamination with staphylococci or *B. subtilis* in criticizing an accouchement set.

The pad, when placed in a sterilized jar, is immediately covered with boiling lemco broth (about 500 c.cm.) and left for seventy-two hours. Subcultures are made into Robertson's medium, and from this subcultures were made into litmus milk and on to the bottom of a tube of Fildes's medium, which should be dry and horny at the top. Subcultures are again made into Robertson's medium from the horny part of the slopes, and after seven days mice are injected. Even if the animal does not die with signs of tetanus mild cases may be recognized by holding the animal up by the tail and placing a pencil between the hind legs. The animal clutches the pencil with its legs; but if there be a mild tetanic intoxication the injected leg soon goes into spasm.

A storm clot in litmus milk is taken as evidence of *Cl. welchii*.

For aerobic culture pads are soaked in sterile saline, filtered through a sterile Gouch filter; the filtrate is centrifuged and the deposit cultured on appropriate media.

It may here be added that pads soaked in lochia have been examined by a similar technique. Vast numbers of bacteria in great variety are present, even when the pads are sold as impregnated with strong antiseptics. This, however, is a separate problem.

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On the occasion of the celebration of the centenary of the Medical Association of Vienna there will be a special festal "week" of medical meetings, receptions, and excursions in Vienna from May 19 to 29, during which addresses will be given by leading authorities in various European countries. The preliminary programme may be obtained from the Kursbüro der Wiener Medizinischen Fakultät, 4, Alserstrasse, Vienna, IX.

PRONTOSIL ALBUM IN PUERPERAL SEPSIS

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A rapidly growing literature, from both the experimental and clinical aspects, proves beyond reasonable doubt that prontosil constitutes an invaluable measure in the treatment of severe streptococcal infections. Recent articles, both in this country and abroad, suggest that its usefulness may not be limited only to infections by haemolytic streptococci. In puerperal sepsis, however, the treatment of this streptococcal infection is of paramount importance, since it is responsible for almost all the deaths.

The following brief notes represent our experience of "prontosil album" ("the sulphonamide") in the treatment of puerperal infections. The use of this simpler "reduction" compound of prontosil seems logical in the light of recent experiments (Colebrook, *et al.*, 1936), which demonstrate that the original compounds, prontosil soluble and prontosil "red," are active against haemolytic streptococci only in so far as they are broken down in the body to the sulphonamide or some closely related substance. Certainly it has been shown that *in vitro* prontosil is not lethal to streptococci, whereas the sulphonamide, prontosil album, can destroy them under conditions of dilution fairly closely approaching those which might be encountered in the body.

The Patients Treated

Prontosil album was used in treatment, in a ward given over to puerperal sepsis, from November 1, 1936, and these notes may be regarded as covering the period from that date till January 31, 1937. During the period under review seventy patients, all proven septic, came into hospital for treatment. There was one death, giving a mortality rate of 1.4 per cent. The average death rate over 1,988 patients, all of whom were septic, treated between the years 1931 and 1936 was 13.5 per cent. The use of prontosil album was limited to twenty-two cases—namely, women who were severely ill, having repeated rigors, frank septicaemia, or peritonitis. This group comprised eleven with septicaemia, four with peritonitis, and seven others. Three patients each received up to 20 c.cm. prontosil soluble on occasion, owing to a temporary shortage of prontosil album. One other received 40 c.cm. prontosil soluble on each of three successive days.

The great drop which has occurred in the death rate raises prominently the possibility that the seventy cases under discussion were less severely ill than those treated in the past. It is agreed that the death rate in puerperal sepsis is closely bound up with the occurrence of septicaemia and peritonitis. In the present group there were eleven cases of septicaemia, eight of which yielded a growth of haemolytic streptococci on primary blood culture. The incidence of septicaemia in the whole group is therefore 15.7 per cent., the average incidence from 1931 till 1936 being 18.6 per cent. There were four instances of generalizing peritonitis without blood invasion, and on laparotomy three yielded cultures of haemolytic streptococci. The incidence of peritonitis of 5.7 per cent. is to be compared with 4 per cent., which was the average incidence over the five years ending in 1936.

It would seem, therefore, that while there has been a slight drop in the incidence of severe sepsis the fall in death rate must be explained by improved treatment or lessened virulence of the infecting organism.

Dosage and Toxicity

In the beginning the dosage used was small, but with increasing experience this was raised to 7.2 grammes (twenty-four tablets of 0.3 gramme) spread over twenty-four hours for averagely ill patients. This dosage, it was discovered, could be continued for seven to ten days without harm. It was found advisable to continue medication for two to three days after subsidence of the fever. Increase in the dosage in more severely ill patients was almost always accompanied by a corresponding clinical improvement. In one very severe case of septicaemia a daily consumption of 14.4 grammes (forty-eight tablets) for four successive days and 7.2 grammes for a further three days was followed by nothing worse than a slight cyanosis, possibly attributable to sulphaemoglobinaemia. Another case of septicaemia received 40 c.cm. prontosil soluble and 10.8 grammes prontosil album for three successive days and 7.2 grammes each day for a further two days, with again nothing worse than slight cyanosis, possibly accounted for by the pneumonic septicaemia, which demanded such heroic dosage. Both cases recovered. In one instance it was noticed that a daily dosage of 10.8 grammes was ineffective till 15 minims of dilute hydrochloric acid were given, somewhat empirically, before ingestion of the tablets.

From the remarks above it is obvious that the toxicity of prontosil album is low. Sickness and vomiting occurred in one case after a total dosage of 75 grammes spread over nine days, and ceased on discontinuing the drug. The urine from several highly dosed patients showed no casts, but mild albuminuria appeared twice where it had not hitherto been present. In three patients difficulty in micturition developed, amounting almost to retention of urine. There was no oliguria. In no case was jaundice recorded, nor were there nervous symptoms. Sulphaemoglobinaemia was noticed as a possibility in the two cases already mentioned when dosage was discussed. In this respect it may be mentioned that magnesium sulphate, which, it is thought, may have some causal influence, was given in one case only. In the other the probability of sulphur compounds being present in commercial glucose cannot be ignored.

A much larger number of patients have been treated with the sulphonamide, prontosil album, than with the original injection preparation, prontosil soluble. So far as the death rate gives any indication the two drugs are apparently of equal value. The obvious advantages of an easily ingested preparation over large and sometimes painful injections need only be mentioned. Some of the temperature charts reviewed suggest that the action of prontosil album is more rapid than that of prontosil soluble, even allowing for the quicker absorption of the latter. On present knowledge of the pharmacology of these drugs it would appear reasonable to combine the two preparations, the injections acting perhaps as a depot of continuous sulphonamide therapy. In severe peritonitis the ingestion of large numbers of tablets, possibly roughly chewed by the patient, and the swallowing of considerable amounts of fluid may be open to objection.

Case Reports

Below are set out the abbreviated records of three cases illustrative of the type of result obtained. The first case is one of septicaemia with peritonitis, the second one of what appears to have been, despite the absence of confirmatory blood culture, septicaemia associated with multiple bacterial emboli. The third case is one of moderate severity, and is quoted to complete the clinical picture.

Case 1.—A 5-parous woman aged 30 years was confined on October 30, 1936, when the perineum was badly torn. She sickened on November 1 with rigors, cough, and abdominal pain, and was admitted on November 3. On admission the temperature was 104° F., the pulse rate 128, and the respirations 34 a minute. She was very pale, and had a gross patchy bilateral bronchopneumonia with extensive pleural friction. Peritonitis was present up to a level higher than the umbilicus. A blood culture which was taken on admission yielded a liberal growth of haemolytic streptococci. An immediate laparotomy revealed a generalizing peritonitis, which was drained. The sero-pus yielded numerous colonies of haemolytic streptococci. She was given 0.9 gramme prontosil album four-hourly (three tablets) as soon as she could swallow. The following day her peak temperature was 101° and within forty-eight hours was normal. Prontosil album was continued for five days at the same dosage. The convalescence was interrupted by the development of phlegmasia alba dolens.

Case 2.—A woman aged 31 years, 2-para, was confined on December 30, 1936. There was no gross trauma, but she sickened on January 5, 1937, with rigors, headache, and a scarlatiniform rash. We admitted her on January 11 with patchy bronchopneumonia and a widespread scarlatiniform rash tending to vesiculation on the face and soft palate. There were numerous acutely inflamed painful indurated areas beneath the skin on the arms, knuckles, and legs. There was possibly early effusion into the right elbow- and the left ankle-joint. Blood culture was negative, but the patient was undoubtedly septicaemic. At the beginning of therapy by prontosil album 1.8 grammes (six tablets) four-hourly her temperature was 103.2°, pulse rate 128, and respirations 24 a minute. She was slightly cyanosed. Allowing for doses missed during sleep she received a total of 250 tablets (75 grammes) prontosil album in four-hourly doses over nine days, by which time the illness was over. The rash, induration, and vesicles retrogressed on the fourth day of treatment, and the joints, once thought to be the seat of septic arthritis, were free of pain and swelling on the seventh day. One larger induration, which became semi-fluctuant and from which it was hoped to culture an organism, was totally absorbed.

Case 3.—A girl aged 19 years was confined on December 8, 1936. A persistent occipito-posterior presentation resulted in a severe perineal tear. She sickened on December 10 with an erythematous rash and a rise in temperature to 107° and a pulse rate of 160 a minute. She was immediately given two tablets of prontosil album, and this was repeated in four hours. She was admitted to Robroyston Hospital on December 10 with a temperature of 99°, pulse rate 104, and respirations 24 a minute. Her symptoms were suggestive of acute metritis. She was given prontosil album, two tablets (0.6 gramme) four-hourly for four days, after which the temperature was normal. A blood culture, taken on admission, yielded scanty haemolytic streptococci.

Summary

1. Out of a series of seventy cases of puerperal sepsis twenty-two were treated with the "sulphonamide" preparation prontosil album. Four of these had, in addition, occasional doses of prontosil soluble by injection. The other forty-eight cases were not considered sufficiently serious for chemotherapy.

2. Eleven of the twenty-two cases treated with prontosil album had septicaemia, eight proved by blood culture to be due to haemolytic streptococci, and a further three cases of peritonitis without septicaemia all yielded haemolytic streptococcal colonies on culture of the peritoneal fluid. The balance—seven cases—showed a haemolytic streptococcus on bacteriological examination of the vaginal discharge.

3. The dosage of prontosil album was high, ranging from 3 grammes (ten tablets) to 14.4 grammes every twenty-four hours, but the preparation was well tolerated and toxic effects were minimal.

4. The fall in temperature and the general improvement were rapid and striking.

5. The success of the treatment is evidenced in the mortality rate of 1.4 per cent. (one death) in the whole series, as compared with 13.4 per cent. in a five-year period in the same hospital.

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Clinical Memoranda

Method of Removing Wax Foreign Bodies from the Bladder

From time to time reports are published of the removal of pieces of wax from the urinary bladder by means of rongeur forceps, lithotrites, or even by suprapubic cystotomy. (One transatlantic clinician recently reported how a patient had succeeded in voiding a piece of wax by urinating while suspended upside down from a trapeze.) It does not appear to be sufficiently widely recognized that a number of wax solvents, such as xylol, will deal with this type of case with a minimum of discomfort to the patient. Hattinger was the first, I believe, to describe the use of xylol for this purpose.

I have recently come across two cases in which wax had been introduced by a male patient along the urethra for erotic purposes, and, as so often happens, the distal portion of the improvised wax bougie broke off, the remainder entering the bladder, whence it did not escape, and set up an inflammatory reaction.

The first case, a boy of 16, was brought to me a few days after the "incident" had occurred. He was suffering from frequent and painful micturition, and no attempt was made to hide the origin of the trouble. Cystoscopy revealed the presence in the dome of the bladder of a flattened piece of wax about the diameter of a shilling. The cystoscope was withdrawn, a catheter passed, and the bladder filled with 6 ounces of sterile water; 10 c.cm. of xylol was then introduced, and the catheter spigoted. The catheter was left in position for two hours, the suprapubic region being kneaded at frequent intervals to aid the solution of the wax in the xylol. On removal of the spigot the bladder emptied, the terminal few cubic centimetres being a white milky substance, representing the wax in solution. A cystoscope was again introduced, and no longer was there any evidence of the wax.

A few weeks later a similar case came into All Saints' Hospital under the care of my colleague, Mr. F. McG. Loughnane. The history in this case did not give any inkling as to the cause of the dysuria, but cystoscopy revealed the presence of a piece of wax in the dome of the bladder. I related my experience in the first case and the same procedure was adopted in this second one with complete success.

London, W.1. TERENCE MILLIN.

Reviews

SURGERY OF CANCER OF THE LUNG

La Chirurgie du Cancer du Poumon. Bases Anatomo-Cliniques et Expérimentales. Technique Opératoire. By O. Lambret, M. Malatray, and J. Driessens. (Pp. 198, illustrated.) Paris: Masson et Cie. 1936.

The physician should always be on the alert for the possible presence of a neoplasm of the lung, but it is the surgeon who eventually establishes the diagnosis and decides whether treatment is practicable. Drs. Lambret, Malatray, and Driessens of Lille have written a monograph which should therefore prove of great interest to all thoracic surgeons. It forms an admirably practical summary of the present position in regard to a subject which has only just passed the experimental phase. The authors dismiss radiotherapy as having proved a failure in the treatment of cancer of the lung, and confine themselves to a discussion of lobectomy and total pneumonectomy; the latter is to be preferred, since in expert hands it gives much superior results and is now carried out with only a slightly greater operative mortality.

As their subject is so recent (and the literature limited) the authors have been able to present it in a succinct and logical manner. The diagnostic basis of the surgical treatment is discussed in three stages (clinical, radiological, and bronchoscopic), and there follows a description of the anatomo-pathological details essential in deciding whether surgical intervention is justified. The indications for surgery are then given, and the detailed description of the operative technique of pneumonectomy—and less fully of lobectomy—is preceded by a chapter on the experimental work which has now been carried out for many years. A chapter is devoted to the results of surgical treatment of broncho-pulmonary cancer. Up to the time of writing the book fifty-eight cases had been reported in the literature (all confirmed histologically), of which forty were treated by lobectomy. Of the total number twenty-five (43 per cent.) were "cured": eleven are living four to seven years after the operation. It is of great interest that while the operative mortality of the lobectomy cases was 30 per cent. as against 50 per cent. in the pneumonectomy patients, the former show "cures" (up to three years) in 10 per cent. and the latter in 40 per cent. (but, of course, out of a total of only eighteen cases). Certain points in regard to the lobectomy cases are summarized in tabular form, and more detailed notes are furnished of the pneumonectomy patients (with two personal observations).

Throughout the book full credit is given to the Brompton school of surgeons. And a final point to be noted is the insistence on the safety of exploratory thoracotomy, which offers at present the only means of securing a larger number of treatable cases. The volume is exceptionally well produced, and contains several good plates and a full bibliography (since 1928 only). It is a work that can be heartily recommended.

PATIENT, NURSE, AND HOSPITAL

The Patient Looks at the Hospital. By Florence G. Fidler. Foreword by Joan Malleson, M.B., B.S. (Pp. 128. 2s. 6d. net.) London: Robert Hale and Co. 1936.

When writing this indictment both of hospital management and of the whole nursing profession Miss Fidler forgot the value of understatement in the presentation of a case. The chief faults of her book are so manifest that they can do little harm. They are, that an entirely one-sided picture is drawn in most exaggerated terms by generalizing from an isolated personal experience, and that while she has supplemented her first-hand knowledge by an intelligently chosen course of reading, she picks out only those portions which lend themselves to the heightening of the picture. Illustrations of these faults can be found on many pages. Here are two:

"the quite peculiar mentality of the trained nurse—a queer mixture of expert knowledge of her subject, an intense devotion to duty, an unlimited capacity for self-sacrifice on the one hand; on the other, immeasurable conceit, abysmal stupidity, complete lack of imagination, often a mean, petty attitude towards others, and always a deficiency of common sense and intelligence in everyday affairs."

"there are no really grateful patients, and the reason why persons sometimes express themselves as such is that they have been so terrorized while in hospital that they feel obliged to pretend and to make false statements lest, if they return there, they may suffer from not having expressed the correct amount of gratitude demanded."

A further point to be noted is that, although in her final chapter the author directs her case against the voluntary hospitals only and advocates a State service, there is no reason at all why the faults which she so strongly alleges should not be just as prevalent in council as in voluntary hospitals. Nevertheless the book may be worth reading. It at least draws attention to three things of importance: that the conditions of work of nursing staffs are unsatisfactory, that ward routine is defective, and that all subscribers to all voluntary hospitals (to whom the book is dedicated) should not be content with giving their subscription but ought to show an active concern in the conduct of the institution to which it has been given.

MEDICAL GYMNASTICS AND MASSAGE

The Technique, Effects, and Uses of Swedish Medical Gymnastics and Massage. By Dr. J. Arvedson. Translated by Mina L. Dobbie, M.D., B.Ch. Third edition. (Pp. 262; 131 figures. 12s. 6d.) London: J. and A. Churchill. 1936.

The third edition of Dr. Arvedson's book, which appeared in Sweden in 1932, has been translated into English by Dr. Mina Dobbie, to whom credit is also due for translating and editing the companion volume—*Medical Gymnastics and Massage in General Practice.* Both books are well known, because they cover the course for students preparing for the examination of the Chartered Society of Massage and Medical Gymnastics. The present volume contains all the material necessary for a thorough grounding in the movements and manipulations used in Swedish gymnastics and massage, and is hence invaluable to those wishing to qualify for the examination and to practise the system. All procedures are described clearly, their effects and uses explained, and the working muscles in each case enumerated. The descriptions are supplemented by photographs, numbering about eighty. These fulfil their purpose clearly, but some of them are so antiquated in style as to be unsuitable for inclusion in a modern textbook. If military recruits instead of women had been the models photographed there would be less cause for criticism, but the rigid lordotic postures of, for example, Figs. 17 and 32, should be suppressed rather than displayed as exemplary.

It is unfortunate that Ling's system, which was primarily intended to develop the physique of soldiers, has had such a militaristic influence on gymnastics. It was certainly successful in its purpose, but has become too general in its application. In other countries, Denmark and America notably, gymnastics for women and

children are not made to conform to this military mould, and the results are excellent from physiological and aesthetic standpoints. In describing manipulations used in massage Dr. Arvedson makes one statement which may cause confusion. On page 219 we read: "Colon-stroking aims also at giving a direct onward impulse to the intestinal contents"; but it is well known that any mechanical propulsion would be dangerous and that reflex effects are the only justifiable aim.

Though struck with admiration for the thoroughness and conscientiousness of Dr. Arvedson's book, we are aware of a disquieting sense of the limitations of the system, and wonder if it is not time, "Lest one good custom should corrupt the world," for the whole outlook on Swedish gymnastics to be fearlessly revised. There is a tendency to concentrate too closely on certain isolated groups of muscles, to strengthen these by repetitive work in the gymnasium, and then to discharge the patient with an exhortation (too often futile) to continue exercises at home. The need would appear to be for a "far-off" view of the patient, so that the why and wherefore of faulty muscle habits may be understood before attempts are made to correct them. And when correction is possible in the gymnasium the muscle action achieving it should be studied with a view to its incorporation, in the long run unconsciously, in the movements of everyday life. Systems of "daily exercises" will not suffice, even if correctly performed, unless the muscles concerned are brought freely into ordinary use.

DIXON'S PHARMACOLOGY

A Manual of Pharmacology. By Walter E. Dixon, M.A., M.D., F.R.S. Revised by W. A. M. Smart, M.B., B.S., B.Sc. Eighth edition. (Pp. 483; 79 figures. 18s. net.) London: E. Arnold and Co. 1936.

The first appearance of Dixon's *Manual of Pharmacology* in 1906 was an important event in the development of pharmacological science. The outstanding features of the book were the manner in which the actions of drugs were clearly and dogmatically defined and the beautiful experimental records that illustrated these actions. The textbook has maintained its popularity ever since, and it is pleasant to learn that it has survived the untimely death of its author and is to be carried on by Dr. W. A. M. Smart.

The eighth edition has retained the general form and size of its predecessors, but the contents have been completely recast. Some of the most obvious changes are that the graphic records are less prominent, while a great increase has been made in the use of structural formulae. Clinical observations on the action of drugs are now included, and there has been a liberal insertion of prescriptions illustrating the practical application of the subject-matter. These changes have affected the general character of the work. Dixon's textbook was primarily concerned with the action of drugs as revealed by animal experiment, whereas in its new form much more attention is paid to current therapeutic practice. As regards the choice of prescriptions, the author has deferred here and there to clinical traditions in a manner that we think unfortunate. An elementary textbook of this kind is intended to introduce the student to the rational use of drugs, and it would seem desirable to choose prescriptions whose composition can be defended on logical grounds. In some cases, however, prescriptions are given containing traditional complexities, the rational basis for which is not immediately apparent—for example, the combination of ammonium, potassium, and sodium bromides, and the combination of the powdered leaves of stramonium, belladonna, and hyoscyamus. Other prescriptions preserve clinical traditions that are now being discarded—for example, the three prescriptions for iron salts which are given contain 1, 2, and 3 grains of iron salts respectively.

In view of the fact that the book has been rewritten with a distinct trend towards therapeutics, it is rather surprising that more space has not been devoted to the hormones, but insulin and the thyroid together occupy less than a page. Apparent irregularities such as these are bound, however, to occur in a textbook which is in a process of revision, and considered as a whole the manual gives a very clear account of the outstanding facts of modern pharmacology, and the free use of structural formulae has made it possible for Dr. Smart to show clearly the important services that organic chemistry has given to therapeutics in recent years.

PSYCHIATRY

Theory and Practice of Psychiatry. By William S. Sadler, M.D. (Pp. 1,231. 42s. net.) London: H. Kimpton. 1936.

Dr. William S. Sadler, the chief psychiatrist and director of the Chicago Institute of Research and Diagnosis, has written a voluminous work on this subject. He explains that while there is an abundance of literature dealing with the psychoses from the institutional point of view, there seems to be a dearth of practical literature on the non-psychotic groups of nervous disturbances, affording help to the physician in general practice or occupied with one of the many specialties in his efforts to aid those of his patients who are more or less neurotic or who may be suffering from more serious mental and nervous ailments. It is with the idea of helping to meet this need that the book has been written.

It has thus been the motive of the author to help professional readers of all classes rather than to confine his text to the recording of experience for the exclusive perusal of the psychiatric specialist. He hopes in this work to contribute something which will assist the medical profession in divesting mental hygiene of many of its psychiatric mysteries and deliver it from the "confusion of tongues"—the sectarian clamourings—that have served so to obscure the "common-sense" methods of study and practice which the rank and file of the profession are well qualified to undertake if they are once delivered from the "mystifications" of the multifarious teachings of the conflicting schools of psychiatry.

This massive tome is perhaps rather heavy for those who have no training in psychiatry, but it will certainly be most useful to those who have taken up psychiatry as a career.

OSTEOLOGY

Bones. A Study of the Development and Structure of the Vertebrate Skeleton. By P. D. F. Murray, M.A., D.Sc. (Pp. 203; 45 figures. 8s. 6d. net.) London: Cambridge University Press. 1936.

This is a new book, written from a point of view somewhat different from that of the standard textbooks on osteology. It deals with the development and structure of the vertebrate skeleton, and is partly founded on recent experimental work carried out by the author and his colleagues at the Strangeways Laboratories, Cambridge, and partly on that of previous workers at the same school and abroad. He discusses anew many of the problems bearing on the interaction of heredity and mechanical factors in the growth and determination of form of such long bones as the femur or humerus, and emphasizes the important part played by heredity in determining the specific form of the primary cartilaginous model of a long bone.

Beginning with the description of the differentiation—of an explant taken from the axial condensation of mesoderm in the limb bud of a chick embryo—into the *cartilaginous* rudiment of a long bone, the author proceeds to discuss the development of the *bony* skeleton, from the cartilaginous model and the functional changes which take place secondarily as the result of mechanical stresses. He further considers the microscopical structure of cartilage from the mechanical standpoint and the mechanism of bony adaptations in the later stages of development. The author's comments on the following subjects are particularly interesting: the formation of joints; ankylosis, pseudo-arthroses; ectopic formation of bone; and changes in form due to variation in function, as illustrated by the form of the calcaneus in a child at birth, an adult man, the orang—which is arboreal in its habits—and the gorilla and baboon—which live chiefly on the ground. A well-marked similarity in form exists between the calcaneus of the orang and the human infant, whereas when the child begins to walk the heel bone assumes the flattened form which characterizes the plantigrade type present in the gorilla and baboon. The bearing of the "trajectorial theory" on the architecture of bone and Triepel's hypothesis of the harmonic adaptation of structure to external form are well presented and discussed.

The book is clearly written and singularly free from bias; it is well illustrated and contains a representative list of references, and should prove a useful stimulus to further work on the subject.

Notes on Books

Mr. GREGORY BATESON'S *Naven* (Cambridge University Press, 18s.) is an anthropological study based upon the author's two expeditions to the Iatmul people, who live on the middle reaches of the Sepik River in the Mandated Territory of New Guinea. "Naven" is the term applied to certain ceremonies performed in celebration of major or minor achievements, and these ceremonies are characterized by the custom of men dressing up as women and women dressing up as men. The achievement invariably honoured by naven is homicide, which, at any rate until recently, was often perpetrated at a very early age, a small boy being assisted by the appropriate sponsor to drive a spear into the living body of a bound and helpless captive. Minor cultural acts celebrated only on first achievement include the killing of certain animals, the planting of certain plants, making a canoe, and spotting an opossum in the bush. Mr. Bateson's object is to relate the ceremonial behaviour of naven, by means of a new technique, not only to the structure and pragmatic functioning of Iatmul culture, but also to its ethos. From this it may be inferred that the book is written for anthropologists, and that some knowledge of this science is necessary for its proper appreciation.

The Archaeology of Sussex, by Dr. E. CECIL CURWEN, is a further addition to Methuen's series of county archaeologies under the general editorship of Mr. T. D. Kendrick of the British Museum. Dr. Curwen regards Sussex as a microcosm peculiarly suitable as a subject of regional archaeological study. He states that until recently London's week-end playground of to-day was separated from the North by a barrier of clay-land and forest. Even as lately as 1818 Bishop Buckner advised the new curate of Waldron to take up residence before the onset of winter or risk an indefinite postponement of arrival. The book opens with a chapter on archaeological methods. Aerial photography has produced striking results. By this means ancient sites may be delineated through the medium of standing corn, which grows more richly over the greater depth of fertile soil covering prehistoric pits and ditches. In excavation "it is almost as improper for an inexperienced person to dig into an ancient site as it would be for such a person to perform a surgical operation." Dr. Curwen traces the history of Sussex from its earliest beginnings to Roman times, correlating such famous county antiquities as the Piltdown Skull, Chanctonbury Ring, Cissbury, and Anderida with their appropriate periods. As a doctor in active practice the author is to be congratulated on writing a book which shows evidence of remarkable industry and scholarship. It is profusely illustrated, and it should be a source of profit and pleasure to all who are interested in archaeology or who are acquainted with Sussex. The price is 12s. 6d.

Preparations and Appliances

AN ANAESTHETIC AIRWAY CAP

Mr. HERBERT CHARLES, anaesthetist at Royal Masonic Hospital, writes:

The upper figure illustrates a metal cap for use where continuous gas or gas-oxygen-ether administration is required. By means of two spring clips it can be attached to any ordinary flat-topped airway and so bring the hole in the cap into position with that of the airway, whichever size of airway is used. The centre part with projecting arm is made to revolve, so that this can be used in any position. The top plate, in which there is an oblong opening, is also movable, so that by twisting it round this opening can be made to coincide with a similar opening in the plate beneath and air admitted as required.

The rubber flange illustrated is of soft rubber, 3/32 in. thick, and when in position as in diagram is tucked inside the lips to prevent the escape of gases or air around the airway. The flanges are made in three sizes, suitable for men, women, and children, the sizes being roughly 9 by 5 cm., 7.5 by 4 cm., 6.5 by 3.75 cm., and the hole in the centre 1.5, 1.25, 1 cm. respectively. The hole being round causes the flange to curve downwards; this corresponds better to the shape of the mouth and keeps more easily in position.

The lower two figures show the metal part of an airway with a short telescopic slide, which can be lengthened or shortened according to the length of airway required. This saves the necessity of carrying several, two or three being ample—one for children and the others for adults.

Both appliances are manufactured by Messrs. A. Charles King Ltd.

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MEDICINE AND THE FACTORIES BILL

The discussions within and without Parliament regarding the new Factories Bill reveal a significant change of attitude on the part of the public. Despite its shortcomings the Bill has served to show that it is now generally accepted that health is a function of economic life and that the maintenance of health entails the closest co-operation of many diverse interests. There are certain matters that from a medical standpoint we would wish to see amended in the Bill, others that can be corrected by such Orders as the Secretary of State will be empowered to make. Rule by the Executive, as distinct from legislation by Parliament, may have many drawbacks and dangers. The Lord Chief Justice has pointed these out from time to time, and we are not blind to the serious defects of this method of government. It is, however, difficult to see how, in the absence of this more elastic system, codes can ever be devised to meet the rapidly changing conditions such as are presented by modern industrial technique. The obvious moral to be drawn is that legislation is no substitute for education. The operation of this measure will depend not only on the wisdom of Parliament, but on the influences that are brought to bear on the Secretary of State, H.M. inspectors, employers, workers, and medical men and women. Given a good framework, which we hope this Bill will provide, the need for a fuller, wider and developing social conscience, and a deepening knowledge of the relevant facts, will grow in the future. On the whole we have to admit that the method of rule by Order as envisaged so fundamentally in the Factories Bill is the only way to keep the code abreast of the changing needs of the time.

Our profession has heavy responsibilities under this Bill, and we must see to it that from the start of medical education the student's mind is kept alive to the economic and industrial aspects of his professional work. On the physical and psychological sides of clinical medicine in everyday practice industrial and occupational factors figure largely. Within industry doctors are called on to adjudicate and advise, and therefore they must be prepared to understand more clearly than hitherto what are the basic desiderata of healthy life in industry.

To start this new campaign with as few obstacles as possible we would wish the Bill amended in certain important particulars. Many had hoped to see the total abolition of overtime for young persons, and provision made for educational facilities with pay. We regret that the age of entry is not raised to 15, because it seems that this omission nullifies the recent legislation which apparently raised the school-leaving age to that level. We believe, further, that young persons need a proper holiday every year, and that the labour of adolescents can hardly be so vital to industry that the provision of fourteen days' holiday with pay would prove unworkable. In point of fact it is sound economics and should be enforced. Everyone ought to have an annual holiday, but certainly adolescents need it as a factor in healthy growth and development. We trust that in the committee stage pregnant and post-parturient women will receive the consideration that we know to be necessary if healthy babies are to be born to healthy and unfatigued mothers. The safety clauses in the Bill are sound, but accidents will still happen. It is urgently necessary that the whole standard of first-aid should therefore be raised. It is still very badly done in large sections of industry, and should be subject to a new and strict clause. All first-aid arrangements require medical supervision and approval.

The many excellent features of the Factories Bill deserve praise. Our object, however, is not to dispense laurel wreaths at this stage, but rather to use our influence to achieve amendments in the next few weeks which will make this a really good piece of legislation. Now, therefore, is the time for constructive criticism. With the main clauses of the Bill many readers will by now be familiar through the outline given on February 13 at page 367, and a report of the second reading debate in the House of Commons appears in our Parliamentary Notes to-day.

Washing arrangements should be statutory and not merely subject to special Order. Women should not be classed with young persons, but should receive the different treatment that biological reality and human dignity demand. Feeding arrangements could with advantage receive fuller mention and be made more comprehensive, and something should be done to impose on employers who put their works in the country or far from the main centres of population an obligation to ensure certain standards of transport and to adjust hours to meet the reasonable needs of the workers. The provision of civilized conditions of work has been shown to be not a luxury for large firms but an economic asset, and no one, therefore, should assume that decent and humane standards are an

imposition. If a firm cannot employ people properly, better that it should not employ them at all, and we would urge that at any rate in essentials the best industrial practice should be made standard by law, departures therefrom being allowed only in rare instances, for a limited time, and in special circumstances, by the Secretary of State. In the end the community would benefit and, as has been the experience in the past, the "awful economic consequences" of imposing good social conditions would prove to be illusory.

Rheumatism and respiratory diseases take a terrible toll of human efficiency and happiness. It is therefore necessary that these subjects should receive fuller mention in the Bill. Everyone should be able to wash when leaving work, and during working hours outdoor clothing should be so disposed that it will be dry when put on again. Wet outdoor shoes require proper cupboards, and working kit needs airing and drying during the night. Clauses 41 and 42 ought therefore to be made general and universal, and not merely applicable to workers on prescribed processes. Those who work in exposed places need proper waterproof overalls, and the small cost of these would be offset by a great reduction of sickness. The worker ought not to be expected to bear the cost of special kit to keep him or her dry and comfortable in a wet, exposed, or cold occupation. The care, maintenance, and disinfection of respirators should be a task imposed on a single official in every factory where such apparatus is required. It is inadequate to supply protective clothing and apparatus unless it is the duty of some one person to take care of this equipment and see that it is used correctly. The time has also come to standardize stretchers and ambulance equipment, so that any risk of having to transfer patients in course of transit may be avoided. A single clause could effect this very necessary reform within a few years. While there are admitted difficulties in the universal adoption of a five-day working week, the premium and privileges outlined in the Bill in favour of those who adopt it are most commendable. They should result in a substantial increase in the number of such schemes. The long week-end is of the utmost value, and results in better health, better work, and, let it not be forgotten, increased consumption of goods, and hence an additional benefit to productive industry.

This Bill is very welcome. Let us see to it that it becomes an even better Act by reason of improvements in committee. The good will and help of all parties will not have been misplaced if they make a real contribution to the nation's health. We close on a note of warning. Legislation is no substitute for the voluntary co-operative efforts of an enlightened people. Education in industrial health must go on more energetically than ever, and we must remember that good health is but a facet of the economic and social life of a people, and depends in the last resort on the general level of its technical and cultural education and insight.

THE INFLUENZA EPIDEMIC

The influenza epidemic of 1936–7 has run its expected course, and there is little to be learned from it, except that we are still largely ignorant both of the reasons why the disease should suddenly assume epidemic proportions and of the associated bacteriological problems. Bacteriologists have made and will continue to make every effort to isolate the offending agent, be it virus or bacillus or a combination of the two; it is to be hoped that epidemiologists will in time be able to adduce reasons for the apparently capricious nature of the epidemic manifestations. We would suggest that a careful comparative study of the meteorological conditions obtaining in epidemic and non-epidemic periods might throw some light on the prevailing darkness. The doctrine that such outbreaks are due to the increase in the number of susceptibles in the inter-epidemic years and that the incidence only falls when the supply of susceptibles is exhausted does not furnish such a satisfactory answer as it does in measles. There appear to be definite variations in individual susceptibility, and any immunity which develops is inconstant and transient. There must be some undiscovered factor which either activates a normally harmless organism or lessens the usual body resistance.

Influenza not being a notifiable disease we can only estimate the total number of cases and the rate and direction of the spread of the outbreak by the return of deaths and of primary or influenzal pneumonia. Neither of these figures necessarily gives a true picture of the incidence of a disease in which death and serious complications have not been an outstanding feature, but the table given below may be taken as a fairly accurate indication.

The deaths in the seven weeks of real epidemic prevalence in London and in the 122 great towns were 1,361 and 6,158 respectively; in the corresponding period during the 1933 outbreak the figures were 1,802 and 9,092. The forecast made in our issue of January 16 that the epidemic would be less severe than that of 1933 has therefore been justified. Generally speaking, it is evident that the South-Eastern area and London were affected first and that the spread was to the Midlands and the North. Judging from reports from these areas the dislocation of trade and other activities consequent on the epidemic were even more pronounced in

the weeks after the peak was passed in London than the number of deaths would suggest. A large number of the pneumonias and deaths were in persons of over 50 years, and the tendency for serious sequels to develop in adolescents in the later stages of the epidemic was not observed, as it has been in previous outbreaks. Cases of pneumonia of the severe toxic or "heliotrope" type so common in 1918 were very rarely seen. Clinically the disease has been generally mild: the onset has usually been sudden with malaise accompanied by headache, backache, laryngitis, and tracheitis as the most constant features. A temperature range of 99° to 103° has been the rule, pyrexia usually persisting for forty-eight hours. A painful dry cough in the early stages followed by varying degrees of catarrh has been common. Marked prostration has as a rule followed, and few patients have been really fit in less than a week, the majority feeling "washed out" for considerably longer. Pains of a neuralgic type in the scalp have often persisted. It is probable that we shall not have a further visitation on the same scale for at least two years, and it is to be hoped that before then further facts as to causation and spread will be forthcoming.

Influenza Deaths Weekly from Week Ended December 5, 1936.

	Dec. 5	Dec. 12	Dec. 19	Dec. 26	Jan. 2	Jan. 9	Jan. 16	Jan. 23	Jan. 30	Feb. 6	Feb. 13
London	3	11	12	25	128	311	344	273	154	101	50
Glasgow	3	4	N.A.	4	11	35	131	108	61	39	18
Manchester	3	2	5	4	4	5	12	41	40	51	46
Newcastle...	—	—	—	—	1	2	5	3	9	9	15
Birmingham	3	4	3	7	8	22	50	51	56	50	53
122 great towns ...	43	54	57	97	325	768	1,100	1,137	1,155	976	697
South-Eastern Area	9	15	24	54	252	631	743	575	342	246	143
Northern Area ...	27	27	20	24	45	87	219	394	578	504	365
Midland Area ...	5	11	12	19	48	98	180	175	192	173	150
Eastern Area	1	—	1	3	3	2	16	26	30	33	18
South-Western Area	1	1	—	1	—	5	12	15	41	36	23
Wales and Monmouth	1	2	4	4	11	18	16	18	14	21	15
Notifications of Pneumonia in London	78	95	113	104	288	414	440	326	211	132	94

CHEMOTHERAPY OF STREPTOCOCCAL INFECTIONS

We described not long ago the very striking developments which have followed the introduction of "prontosil" as a remedy for streptococcal infections. That the action of the drug is not direct but due to the formation in the body of para-aminobenzene sulphonamide is now certain, and future treatment is likely to be conducted mainly with this substance itself. It will be remembered that Colebrook and Kenny,[1] in reporting a second series of twenty-six cases of puerperal sepsis, all of which recovered after treatment with prontosil, announced their intention of treating such cases at Queen Charlotte's Hospital in future with "sulphonamide" only. In this issue will be found a report on the same subject by Foulis and Barr, who have treated eighteen cases of puerperal sepsis with sulphonamide only and four others with a combination of sulphonamide and prontosil. These cases were chosen for their severity, the majority being either septicaemic or suffering from peritonitis; yet there was only one death in the series. These results are of importance not only in confirming the expected efficacy of sulphonamide itself but in indicating to what lengths heavy dosage can be carried without apparent ill effect of any consequence. As is to be expected, the literature of this subject is growing rapidly, and several recent papers contribute something to present knowledge of it. Tréfouël, Nitti, and Bovet,[2] who were responsible for the discovery that prontosil becomes bactericidal only when converted into sulphonamide, have now synthesized no fewer than 116 compounds related to the latter, and tested their therapeutic efficiency in mice, without finding any which is superior or indeed apparently equal to sulphonamide itself, although twenty-eight showed some activity. This study is of considerable interest in clearing the ground and in relating chemical structure to bactericidal efficiency. Another experimental study of some interest is that reported by Berger,[3] who varied the usual procedure in mice by injecting virulent streptococcus culture subcutaneously instead of into the peritoneal cavity. The administration of prontosil by the mouth five hours later limited the spread of the infection and saved the life of the mouse, but even when culture and drug were given simultaneously the development of a local abscess could not always be prevented. This observation strengthens an impression gained from other work that these compounds act much more on streptococci freely circulating in the blood and other body fluids than on those still confined to the original lesion. There is still much to be done in determining how far, if at all, susceptibility to this treatment depends on the site of the infection and the type of lesion produced. One of the first clinical reports from the U.S.A., by Long and Bliss,[4] registers distinct but somewhat guarded approval of the results obtained in nineteen cases, of which five had erysipelas, six scarlet fever or severe throat infections, three wound infections, two otitis media with complications, two uterine sepsis, and one impetigo. These conditions fairly represent the manifold activities of the haemolytic streptococcus, and the reaction of each of them to this treatment merits extended and critical study. Two other recent papers carry these investigations into new fields and remind us that the anti-bacterial activity of prontosil and sulphonamide is not entirely confined to one organism, although such investigations as have been pursued hitherto have revealed no other which is equally susceptible and some which for practical purposes are indifferent to it. Huber[5] claims by treatment with

[1] *Lancet*, 1936, **2**, 1319.

[2] *Ann. Inst. Pasteur*, 1937, **58**, 30.
[3] *Klin. Wschr.*, 1937, **16**, 53.
[4] *Münch. med. Wschr.*, 1936, **83**, 2014.

prontosil to have brought about rapid cure in acute *B. coli* infections of the urinary tract in children, and Rosenthal[6] finds that sulphonamide given subcutaneously in oil protects against pneumococcal infections in mice. Although doubtless other uses for this drug will be found, the principal task which remains is to define in detail the conditions of its utility in infections by streptococci, and to this study everyone in practice is capable of making some contribution.

INTERMITTENT CLAUDICATION

Over a hundred years ago Boulay, a French veterinary surgeon, described a malady in the horse characterized by the development of lameness in one or both hind limbs after a certain amount of exercise; the condition occurred in animals in which the main artery to the affected limb was obliterated. Fifteen years later a similar condition was described in man by Brodie and by Charcot, and it was established that the lameness was due to pain in the affected limb, the pain developing with exercise and disappearing with rest. Many ideas were put forward concerning the nature of this pain, but no attempt was made to provide more than circumstantial evidence until the condition was investigated experimentally in man by MacWilliam and Webster in 1923[1] and more completely by Lewis, Pickering, and Rothschild in 1931.[2] The latter authors showed that the pain is due to stimulation of the pain nerve-endings (thought on experimental grounds to lie in the tissue spaces around the muscle fibres) by the action of some chemical substance released from the muscle fibre during and in proportion to its contraction. In ordinary circumstances this substance is removed so quickly by the circulating blood that even in severe exercise pain does not occur; when, however, the circulation to the muscles is deficient the substance accumulates during exercise to a level sufficient to give rise to pain. In diseased subjects the amount of exercise necessary to produce pain in any group of muscles is thus a useful index of the extent to which their blood supply is curtailed. Several workers, particularly in America, have since confirmed the observations on which these conclusions were based, and have sought to define more closely the nature of the chemical substance causing the pain. One major fact has emerged—namely, that the pain-producing substance is one which is chiefly removed from the muscles by oxidation, for even when the blood supply to the muscle is unimpaired exercise of a limb may be associated with pain if the oxygen content of the inspired air is sufficiently low,[3] or if the oxygen-carrying power of the blood is greatly diminished, as in patients with severe anaemia.[4] The pain-producing substance thus seems to be a normal product of muscular contraction which diffuses readily and is easily oxidized. Elliot and Evans[5] have recently pointed out that lactic acid fulfils these requirements, and describe experiments devised to test the supposition that it is the accumulation of this substance in exercised ischaemic muscles which causes pain. They argue that if this hypothesis is correct then any procedure which increases the blood lactic acid should diminish the amount of exercise needed to bring about pain in the arm whose circulation is arrested. They sum up their results as follows:

"Lactic acidaemia, as brought about by exercise (of the legs), epinephrine, or the introduction of sodium lactate into the body, was regularly accompanied by an earlier appearance of ischaemic pain in the muscles of the forearm. In most experiments this effect outlasted the rise in blood lactic acid content, but in no instance did exercise tolerance return to normal in the face of continuing lactic acidaemia. The converse of this was not always true—namely, decreased forearm exercise tolerance often occurred without rise in blood lactic acid."

As the concentration of lactic acid in muscle must be determined by factors other than the lactic acid content of venous blood, these discrepancies do not invalidate the hypothesis which their main observations support—namely, that ischaemic muscular pain is determined by the local concentration of lactic acid. It may be noted in passing that these authors found the ingestion of 100 grammes of glucose or the injection of 20 units of insulin increased exercise tolerance in the ischaemic arm, observations which may yet be found to have their clinical counterpart in the behaviour of intermittent claudication and angina pectoris in diabetic subjects.

ARTHRITIS IN WOMEN

In a pamphlet based on a lecture delivered last year[1] Dr. Fortescue Fox discusses arthritis in women. He draws attention to the widespread disabling effects of chronic rheumatism at all ages and to the fact that the disease attacks women much more frequently than men. This is especially the case in the more serious variety, rheumatoid arthritis, which is all the more important since it strikes down the adolescent and young women, both married and single, in the hey-day of their productive and reproductive life. The other two varieties of arthritis described by Dr. Fox, the climacteric and osteo-arthritic occurring in middle and old age, are not so devastating in their effects sociologically but none the less very distressing to the individual. Emphasis is laid on the point that arthritis probably never attacks the completely healthy person and that the lowered resistance is at least as important as the invading or coexisting micro-organism. This lowered resistance is probably partly inherent and partly acquired, and the conditions determining this require further study. In considering treatment two factors must be weighed: first, that if it is to be effective at all it must be applied during the early stages and in consequence better ascertainment is desirable, and, secondly, that treatment will have to be continued for a long period. For this latter purpose, as in the case of tuberculosis, some sort of sanatorium or rest home is necessary, especially for the young women afflicted by this disease. If a philanthropic person were to start such an institution it is certain that its usefulness would soon become so

[1] *U.S. Pub. Hlth. Rep.*, 1937, **52**, 48.
[2] *British Medical Journal*, 1923, **1**, 51.
[3] *Heart*, 1929–31, **15**, 359.
[4] Kissin (1934). *J. clin. Invest.*, **13**, 37.
[5] Pickering and Wayne (1933–4). *Clin. Sci.*, **1**, 305.
[6] *Amer. Heart J.*, 1936, **12**, 674.

[1] *Arthritis in Women (A Clinical Survey). Also a Suggestion for Setting Up Rest Houses for Rheumatoid Arthritis.* By R. Fortescue Fox, M.D., F.R.C.P. London: H. K. Lewis and Co. (2s. 6d.)

evident that the authorities would feel themselves justified in extending the scope and number of such treatment centres. The International League against Rheumatism, of which Dr. Fox is president, performs a useful function in co-ordinating rheumatological work, and from all over Europe and North America corroborative details bearing out Dr. Fox's conclusions are being received, many of which are quoted in an appendix to this pamphlet. Public interest in the serious problem of chronic rheumatic disease is undoubtedly being awakened, but the nation as a whole has done little more than stir in its sleep, and Dr. Fox's contribution should help still further to arouse the national conscience.

CEREBRO-SPINAL FLUID PRESSURE

The importance of examining the cerebro-spinal fluid in the diagnosis and treatment of organic diseases of the nervous system is now generally recognized. Researches on the hydrodynamics of the fluid are opening up a new field of therapy based upon a knowledge of variations in pressure, their causation, and their effects on the brain. Most of the work on this subject has been done in the United States, where experimental study of a high order begun by Dandy and by Weed has been followed by that of Pollock and Boshes.[1] Both by the ingenious construction of models representing the cerebro-spinal system and by animal experiments these authors have made a noteworthy contribution to the study of variations in pressure of the fluid. Their observations on manometry are particularly valuable. The cerebro-spinal fluid pressure is usually measured by an "open" manometer, one which allows the atmospheric pressure to act on the subdural contents, the pressure being determined by reading the height to which the fluid is allowed to flow into an open tube on connecting the manometer to a needle inserted into the subdural space. This reading is not the absolute pressure before the escape of fluid (as fluid has escaped into the manometer), but the relative pressure. In order to obtain the absolute pressure the ordinary practice is to use a "closed" or "bubble" manometer, in which a bubble of air is placed in a glass tube interposed between the manometer and the spinal fluid. When the manometer is opened to the pressure of the fluid the bubble is displaced outwards. The manometer having been raised until the bubble has returned to its original position the absolute pressure may be measured by the height of the column of fluid in the manometer above the needle in the subdural space. Pollock and Boshes use another, simpler method, which is to let the cerebro-spinal fluid escape into the manometer, and then, by raising the manometer, to push the fluid back into the subdural space until the original level at zero is reached. The absolute pressure is the height of that point above the needle. By means of this method, and by measuring both relative and absolute pressures on models and on dogs, Pollock and Boshes conclude that if accurate studies of cerebro-spinal fluid pressures are to be undertaken only the absolute pressure should be recorded. Experiments on the effect of atmospheric pressure on the circulation of the fluid showed that the cerebro-spinal contents are exposed to atmospheric pressure solely through the blood vessels, and that the difference in the pressure of the cerebro-spinal fluid in the head-down and tail-down positions depends on the difference in pressure in the blood vessels in these positions. The conception that the cranial contents are encased in a rigid covering is criticized, and Weed's conception of the elasticity of the cerebral coverings is subjected to experimental trial.

[1] *Arch. Neurol. Psychiat.*, Chicago, 1936, **36**, 931.

"RADICULONEURITIS"

The war gave a unique opportunity to those medical men serving with the forces of investigating many rare and ill-defined clinical syndromes in a large number of individuals living under standard conditions. Outstanding work was done in neurology both in this country and in France. Among the disease entities previously unrecorded were two distinct types of peripheral neuritis. The one, acute febrile infective polyneuritis, was described by Gordon Holmes and by Rose Bradford; the other, called "radiculoneuritis" by Guillain, Barré, and Strohl, was later known as the Guillain-Barré syndrome. Lately there has been a renewal of interest in this syndrome, as numerous cases have been seen in France. Guillain[1] has recently reported ten cases and has re-defined the characteristics of the syndrome. It occurs in both sexes during the middle period of life; it is very rare in childhood and in old age. He is convinced that the cause of the polyneuritis is a neurotropic virus which becomes actively noxious as the result of some previous infection, usually of the upper respiratory tract. Absence of fever forms one of the distinguishing features between this syndrome and that described by Holmes and Bradford. Pain, both spontaneous and provoked by pressure on the muscles, is often severe, especially at the onset of the illness. Motor weakness, spreading as a rule from the lower to the upper limbs, presents all the characteristics of a peripheral neuritis. The sphincters are but rarely involved, but paralysis of cranial nerves, particularly of the facial nerve, is not uncommon. Abolition of tendon reflexes is the rule, and may persist as the sole remaining sign of the neuritis long after complete clinical recovery. The chief distinguishing feature of the syndrome is, according to Guillain, the great increase in protein in the cerebro-spinal fluid without a corresponding increase in cells. He refuses to recognize those cases of polyneuritis which do not show this protein-cell dissociation as belonging to the same syndrome. He has found it constant in every case, and his observation has been confirmed by others. The prognosis is favourable in spite of the initial severe paralysis, and recovery is usually complete within a few months. A few fatal cases have, however, been recorded. Morsier and Steinmann[2] reported two cases, both with exactly the same clinical picture. In one complete recovery ensued in a short time; in the other death occurred from respiratory failure owing to paralysis of the respiratory muscles. At post-mortem examination the spinal cord

[1] *Arch. Neurol. Psychiat.*, Chicago, 1936, **36**, 975.
[2] *Presse méd.*, November 21st, 1936, 1890.

was normal. In the peripheral nerves the lesions were wholly interstitial, the axis cylinders remaining intact. There was lymphocytic infiltration of the nerves, especially round the blood vessels, many small haemorrhages, and a great increase in number of the nuclei of the sheath of Schwann. Guillain believes that the course of the disease can be favourably influenced by treatment. He recommends intravenous injections of sodium salicylate, from 1 to 2 grammes daily, in serum containing 10 per cent. of glucose; intravenous or intramuscular injections of quinine or colloidal silver; and inunction with colloidal silver. Arsenical preparations have been found definitely harmful.

PEKING MAN

At the close of 1927 news came from China of the discovery of three more skulls of Peking Man (Sinanthropus). In this way Professor Weidenreich, who took charge of the Cenozoic Laboratory in Peking after the death of Professor Davidson Black, came to have six skulls of this extinct race of humanity at his disposal for study—besides fragments—mostly of jaws and skulls—of other twenty individuals. In a recent communication to the *Times* (February 18) Professor Weidenreich sums up the chief conclusions he has reached concerning the place which must be given to Sinanthropus in the gallery of extinct humanity. Hitherto the pride of lowest place has been assigned to the Java Man (Pithecanthropus). Professor Weidenreich shows cause why China must now oust Java as the home of the lowest known form of humanity. He finds that in brain size a member of the Sinanthropic family had even a smaller brain than Pithecanthropus. Still, this claim will be seen to be not a strong one when it is remembered that among the Australian aborigines of to-day individuals do occur with a brain as small as that of the smallest Sinanthropus—850 c.cm. Professor Weidenreich's claim of a low position for Peking Man in the scale of humanity does not rest only on small-brainedness. He cites characters which ally this ancient form of humanity—at least half a million years old, having lived at a very early phase of the Pleistocene Period—with anthropoid apes on the one hand and Neanderthal Man of Europe on the other, Sinanthropus being a sort of stepping-stone from the one to the other. Very remarkable, too, is the fact that the Peking men and women differed from each other in size and strength almost as much as a male gorilla differs from the female gorilla. Noteworthy, too, is the range of variation in jaw, tooth, and brain size which prevailed in the humanity of Pleistocene China. In his article in the *Times* Professor Weidenreich puts forward the idea that Mongolian features can be recognized in the anatomical make-up of Sinanthropus and that Peking Man may prove to be the modern Chinaman in the rough. This revolutionary conception will not surprise those who are familiar with the address given by Sir Arthur Keith to the newly founded Speleological Association in the summer of last year. In that address it was maintained that the evidence provided by fossil remains indicates that the chief races of modern man—white, brown, yellow, and black—were already separated early in the Pleistocene, and that since their separation all have undergone parallel changes which have given them their "modern" characteristics—reduction in jaw and tooth, with planing down of their rugosities of skull and limb-bones.

"SIMPLE PNEUMONITIS"

Pneumonia in childhood is notoriously different from that disease as it affects adults, and Dr. A. Morton Gill[1] has recently described a series of cases in which he believes there is a low-grade inflammatory process affecting chiefly the pulmonary alveoli, which can be diagnosed from pneumonia and recognized as a separate entity: for this he suggests the term "simple pneumonitis." The child is brought to hospital for a persistent cough of recent origin, loss of weight, and loss of appetite. There may have been expectoration of blood-stained sputum, and the mother may be suspicious of tuberculosis. The child is listless, with normal or only slightly raised temperature, normal respiration rate, and a slightly increased pulse rate. Physical examination of the chest will show one or more areas with slight impairment of percussion note, normal or slightly weakened breath sounds, and rales which are particularly persistent and "sticky" in character. The *x*-ray film reveals mottling in areas of the lung corresponding to those in which abnormal physical signs were found. There is nothing in the history to suggest that this is but the end of a pneumonia, and within a week or two the symptoms, signs, and *x*-ray changes have disappeared. Dr. Gill cites four examples of this observed in the children's department at the Middlesex Hospital. He eliminates the possibility of any of the ordinary types of pneumonia or their sequels, and discards the idea that the "pneumonitis" is a non-resolution of a pneumonia dated from some past illness because of the comparative rapidity with which the child becomes completely well. The importance of recognizing this condition lies in the facts that its prognosis is not so serious as the acute pneumonic infections and that it does not appear to follow the chronic course of those inflammatory conditions of the lung accompanying, for example, measles or whooping-cough.

QUARTERS ON SHIPBOARD AT BELFAST

In our *Supplement* this week will be found particulars of the arrangements made for the visit to Belfast of a liner, the s.s. *Almanzora*, providing accommodation for 450 people for the Annual Meeting of the British Medical Association in July next. In order to ensure that these arrangements are carried into effect bookings must be made in the immediate future.

We regret to announce the sudden death, on February 23, of Sir Henry Jackson, Bt., M.B., chairman of the London and Home Counties Traffic Advisory Committee and M.P. for Central Wandsworth.

[1] *Middlesex Hosp. J.*, 1937, **37**, 20.

ENDOCRINES IN THEORY AND PRACTICE

This article is one of a series on Endocrinology contributed by invitation

THE CHEMISTRY AND ASSAY OF MALE HORMONES

BY

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AND

A. S. PARKES, Sc.D., F.R.S.

The more obvious effects of castration, some of which have been known since early times, comprise atrophy or non-development—according to whether the operation is pre-pubertal or post-pubertal—of the accessory organs and secondary sexual characters. The former include the prostate, seminal vesicles, Cowper's gland, and penis; the latter, the comb of the fowl, the horns of the stag, and the body configuration, the deep voice, and the special distribution of hair in many species, including man. Grafting experiments showed that the control of the testes over the accessory organs and secondary sexual characters was probably endocrine in nature. In 1927 McGee prepared extracts of testis capable of restoring the atrophic comb of the capon, and an endocrine function of the testis was definitely established. Since then androgenic* substances have been found elsewhere in the body, but the effects of castration indicate that the testis is the essential and primary source. Various procedures such as *x*-irradiation, or ligation of the efferent ducts, which cause atrophy of the testis tubules, suggest the interstitial tissue as the site of origin of the testis hormone.

Detection and Assay of Androgenic Activity

Reversal of any of the changes which follow castration or the production of a state of hyperorchidism might be used to detect male-hormone activity. The Chicago workers, Moore, Koch, and Gallagher, used first the capon comb as a test object, but they subsequently described a number of tests on castrated rats and guinea-pigs, based on the cytological condition of the epithelium of the seminal vesicles, prostate, and Cowper's glands, the survival of motility of epididymal spermatozoa, and the power to ejaculate. [See Koch (1932) and Moore (1935) for reviews of this work.] Voss and Loewe (1930) attempted to assess gross size changes in the seminal vesicles of castrated mice, but finally used epithelial changes. Martins and Rocha (1930) measured the size of the seminal vesicles of the castrated mouse before and after treatment. Korenchevsky and his co-workers (1932–3) developed a method based on the weight of the seminal vesicles and prostate of castrated rats. In addition, such tests have been described as the increase of spontaneous activity of castrated mice, the growth of the crest of the male salamander, the production of the nuptial coloration of the male bitterling, growth of the ovipositor of the female bitterling, and blackening of the beak of the anoestrous or capon sparrow.

The only generally employed quantitative tests, however, are those based on production of growth in the comb of the caponized domestic cock or in the accessory glands of the castrated rat. Of these the former is the easier and less equivocal test. The Second Conference on the Standardization of Sex Hormones (*Quart. Bull. Hlth. Org. L.o.N.*, 1935, **4**, 618) recommended that "on the information before the conference the test based on the induction of growth in the comb of the capon is, at present, the only one sufficiently specific for the quantitative determination of activity in comparison with the standard preparation." The conference also agreed that the international standard preparation for male-hormone activity should consist of crystalline androsterone and that "the unit of activity shall be defined as the activity of 0.1 mg. of this standard as tested by a specific biological reaction; this weight is approximately the daily dose required to give an easily measurable response in the comb after five days." An increase in comb size of about 5 mm. in length plus height or 15 per cent. increase in area may be expected from one international unit (I.U.) daily for five days. Detailed techniques have been described by Dodds *et al.* (1930), Schoeller and Gehrke (1931), Freud *et al.* (1932), and Greenwood *et al.* (1935), as well as by the Chicago workers referred to above.

However, it is clearly desirable that quantitative work should be carried out on mammals. Increase in weight of the prostate and seminal vesicles of castrated rats is the simplest mammalian criterion of androgenic activity, and has been used extensively by Korenchevsky (1932 *et seq.*), Freud (1933 *et seq.*), Callow and Deanesly (1935), and Tschopp (1936). With the amounts of androgenic substance now available a readily assessable degree of enlargement can easily be obtained. The total weight of the seminal vesicles and prostate of the castrated rat is between 20 mg. and 50 mg. according to the technique of dissection, and increase to an average of 660 mg. has been produced by only ten days' treatment with male hormone (Parkes, 1936). The chief difficulty lies in the fact that the several accessory glands respond in different degrees to the different androgenic substances, so that the comparative activities of the different substances depend largely upon which organ is employed as a basis for comparison. Androsterone, for instance, is comparatively ineffective on the seminal vesicles, and produces quite an abnormal ratio of growth between these and the prostate. A second difficulty is that the effectiveness of a preparation is greatly influenced by the conditions of absorption (Deanesly and Parkes, 1936a).

Natural and Artificial Sources

The demonstrable male-hormone activity of testis tissue is comparatively small, as might be expected from the small proportion of interstitial tissue present. Thus extract equivalent to 0.5 kg. of tissue may be necessary to induce good comb growth in a five-day test. Favourable clinical results have been reported from time to time with dried tissue or testis extracts of low concentration, but in the absence of objective laboratory tests it is likely that these results are due to psychological rather than to direct physiological action. Testis extracts of sufficient potency, as measured by animal tests, for clinical use could only be prepared at enormous cost. The isolation of crystalline testosterone from bull's testes by David in 1935 was of great importance, but the process is not commercially economical.

* The terms "androgenic," in the sense of causing the development of male organs and characters, and "androgen," a substance with this property, have been used by American writers. They supply very necessary parallels to the terms "oestrogenic" and "oestrogen" applied to female sex hormones.

Loewe and Voss (1929) first reported that extracts capable of reversing castration changes could be prepared from the urine of normal men. This discovery led to the preparation of large quantities of androgenic concentrates for physiological and clinical investigation, but it is now known that the substances in the urine, androsterone and dehydroandrosterone, are different from the active substance, testosterone, isolated from the testis. Crystalline androsterone was first isolated in very small yield from urine by Butenandt in 1931, but it was later found that male hormone equivalent to about 3 mg. androsterone per litre is present. From androsterone the reduction product, androstanediol, has also been made in crude or in pure form. In 1934 Ruzicka and his collaborators prepared androsterone from cholesterol by way of *epi*cholestanol. On the theoretical side this brilliant piece of work confirmed and amplified the details of the constitution for androsterone suggested by Butenandt (1933): practically, it has led to the artificial production on a manufacturing scale of both androsterone and testosterone, and to the ready accessibility of many related compounds for investigation of their physiological activity. The so-called "synthetic" pure male hormones are now far more readily available than the same substances from natural sources.

Although the compounds mentioned above account for most of the androgenic activity of the testis and of urine, it cannot be assumed that other active substances are not present. For instance, the isolation of a crystalline compound from boar's testes, tentatively identified with androstanedione, has been reported. The nature of the androgen detected in bull's blood, amounting to 1 to 2 units per litre, is not yet known. Finally, the substances are as yet unidentified to which the urine of normal women owes its androgenic activity (Womack and Koch, 1932; Koch, 1936), which is about the same as that of male urine, and the significance, if any, of the presence of male hormone in the female is unknown. The phenomena of virilism are outside the scope of this article, although its association with adrenal hyperplasia, and with the excretion of large amounts of androgenic material in the urine, coupled with the isolation from adrenals of a series of steroids which includes a weak androgen, adrenosterone (Reichstein, 1936) indicate that glands other than the gonads must be considered in the story of androgen metabolism.

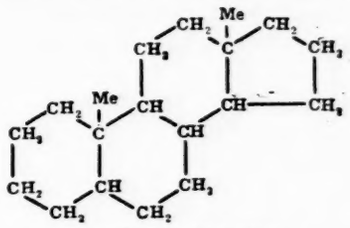
Constitution and Nomenclature

Work now published and in progress on a multiplicity of compounds with androgenic activity makes it necessary to give some attention to the systematic nomenclature.

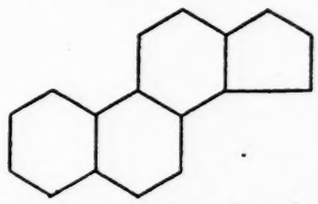
The natural or artificial androgens so far known are all simple derivatives of the tetracyclic hydrocarbon androstane (Formula I). This is the dimethyl derivative of fully hydrogenated *cyclo*pentenophenanthrene, the skeleton of which (Formula II) is regarded as the schematic parent of all the steroids—that is, the sterols, bile acids, male and female hormones, cardiotonic aglucones, saponins, and toad poisons.

The systematic nomenclature of the male hormones is based on the root "androst-" with the addition of appropriate suffixes and of numbers in the usual way to indicate the nature and position of substituent groups. The numeration is somewhat illogical, for historical reasons, and it is fortunate that only five positions need be considered—namely, 3, 4, 5, 6, and 17 (Formula III).

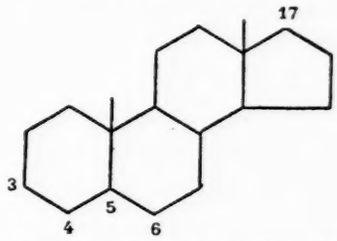
The known derivatives of interest are either dihydroxy-derivatives (-diols), diketo-derivatives (-diones), or mixed hydroxy-ketones (-olones), with the groups in positions 3 and 17, and these may either be saturated (-ane-) or have an unsaturated linkage at 4:5 or 5:6 (Δ^4- or Δ^5-ene-). A series of 17-alkyl-derivatives (for example, 17-methyl- -17-ol) has also been prepared. In certain cases, which need not be dealt with here, it is necessary to consider the configuration (*cis-* or *trans-*) of the groups round carbon atoms 3, 5, and 17. Nearly all the possible permutations and combinations of these substituent groups and double linkages are represented among the artificially prepared compounds, which provide a happy hunting ground for the investigator of relations between chemical constitutions and physiological activity.



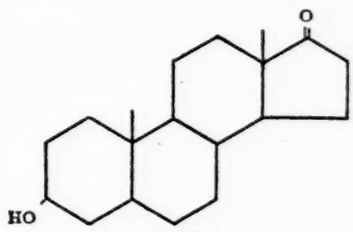
Formula I.—Androstane.



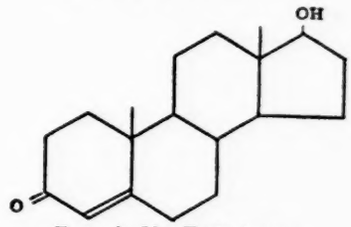
Formula II.—*cyclo*Pentenophenanthrene.



Formula III.—Numeration of androstane derivatives.



Formula IV.—Androsterone.



Formula V.—Testosterone.

The two compounds of greatest importance possess common names: androsterone, which is androstan-3-ol-17-one (Formula IV), and testosterone, which is Δ^4-androsten-17-ol-3-one (Formula V), and some names (of unfortunate ambiguity) have been derived from these—for example, dehydroandrosterone (Δ^5-androsten-3-ol-17-one) and dihydrotestosterone (androstan-17-ol-3-one), and are used in preference to the less euphonious systematic names.

Physical and Chemical Properties

The male-hormone compounds are colourless crystalline substances, readily soluble in most organic solvents, moderately soluble in oil, but very sparingly soluble in water or aqueous media. It is therefore necessary to administer them therapeutically in oil solutions. Such

evidence as is available indicates that they are relatively ineffective when given by mouth, and intramuscular injection is almost invariably employed. The stability to heat, light, and oxygen, so far as is at present known, indicates that there is little danger of deterioration under ordinary conditions of storage. Both testosterone and androsterone are secondary alcohols and therefore readily form esters, which have modified biological activity. The ketonic group is also able to combine with suitable reagents, but the compounds have so far been used only for chemical separation or characterization, and their physiological properties have not been systematically investigated.

Relative Activity of Principal Androgens

The chief compounds with which the clinician is likely to be concerned are testosterone, androsterone, the main active constituent of urine extracts, and androstanediol, which is a reduction product of androsterone not known to occur naturally. Tested on capons the same amount of comb growth is produced by 0.18 mg. testosterone, 0.30 mg. androstanediol, or 1 mg. androsterone. The relative activity on castrated rats cannot be stated simply, for in the first place it involves the different activities on the various accessory glands, and, secondly, conditions of administration and absorption exert a controlling influence on comparative activity. Roughly, androstanediol is about twice as active on the prostate as androsterone and about four times as active on the seminal vesicles. Given under conditions permitting of rapid absorption testosterone is only slightly more active than androstanediol, but where rapid absorption is prevented testosterone is much more effective.

Modifying the Effectiveness of Androgens—"X-Substances"

In the course of their work on testis extracts the Amsterdam group discovered that acidic fractions of extracts from testis, or even from other organs, inactive by themselves, increased the efficiency of certain male hormones when injected at the same time. Any idea of a strictly specific co-hormone and of synergy at the site of action of the hormone was dispelled when Miescher, Wettstein, and Tschopp (1936a) showed that the same adjuvant effect was exerted by a number of pure fatty acids, but only when the hormone was mixed with the fatty acid at the site of injection. The Amsterdam group maintains that the material from testis is of peculiarly high activity, but the balance of evidence is in favour of the view that there is a non-specific effect at the site of injection which may be simulated and replaced for clinical purposes by the choice of a suitable ester and a suitable solvent. The effect of esterification of the male hormones is very marked, as it is with the female hormones, and it seems likely that this is a result of influences on the availability, which depends in turn on absorption and ease of hydrolysis in the body. Androsterone is excreted in normal urine in a combined form, probably an ester with glycuronic acid, which is readily soluble in water and is inactive, perhaps because of rapid elimination. Water-soluble derivatives, the alkali salts of the hydrogen succinates of androsterone and androstanediol, have also been prepared in the laboratory, and, according to Korenchevsky *et al.* (1935), their activities are only one-ninth and one-third respectively of those of the free hormones. The important esters from the therapeutic point of view are those with simple fatty acids. Ruzicka and Wettstein (1936) have prepared the complete series of testosterone esters from formate to valerate and certain others, and Miescher, Wettstein, and Tschopp (1936b) have tested these biologically, reaching the conclusion that optimal activity is possessed by the propionate. This ester, unlike free testosterone, retains effectiveness even with 10-day intervals between injections (Parkes, 1936).

Anomalous Activities of Male Hormone Compounds

The fact that extracts of testis and male urine might show oestrogenic properties has been known for a number of years, but this was usually held to indicate the presence of oestrogenic substances, probably of the oestrone group, in addition to male hormone. It is now known, however, that certain members of the androstane series are oestrogenic. Androsterone was originally reported not to show oestrogenic properties, but it now appears that heavy doses may do so (Wolff and Ginglinger, 1936). Butenandt and Kudszus (1935), however, showed that dehydroandrosterone, androstenedione, and testosterone caused opening of the vagina in the immature rat, and Butenandt (1936) later drew attention to the oestrogenic activity of *trans*-androstenediol, which will cause cornification of vaginal epithelium (Deanesly and Parkes, 1936b). These compounds will feminize the plumage of capon fowl. Androstanediol and testosterone cause enlargement of the uterus of the ovariectomized rat (Korenchevsky and Dennison, 1936). The dual activity of these compounds is important in view of the increasing evidence that prostatic enlargement in man is due to oestrogenic stimulation.

The 17-methyl and 17-ethyl derivatives of testosterone and certain of the other compounds possess the progesterone-like power to evoke progestational proliferation in the rabbit uterus (Klein and Parkes, 1936). Further, testosterone and androstanediol have the progesterone-like power to modify the action of oestrone on the rat vagina, resulting in extensive mucification, and, further, they have the progesterone-unlike power to cause mucification directly when given alone to the ovariectomized rat (Korenchevsky and Dennison, 1936). Testosterone also has some effect on the mammary glands (Selye, McEuen, and Collip, 1936). The biological significance, if any, of these anomalous activities is not yet obvious. Androstanediol (Zuckerman and Parkes, 1936) and also testosterone (Zuckerman, 1936) have the power to protect the male organism from the effects of oestrone.

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COAL-TAR NAPHTHA DISTILLATES FOR DESTRUCTION OF BED-BUGS*

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A number of experiments both in the laboratory and in the field have been carried out which show that the vapour of certain coal-tar naphtha distillates is lethal to the bed-bug (*Cimex lectularius* Linn.). Toxicity experiments have also been carried out by Dr. G. R. Cameron at University College Hospital Medical School, London, and these tests have shown that animals kept for prolonged periods in an atmosphere saturated with the vapour have not been injuriously affected in any way and afford some considerable assurance that no danger to man from this cause is to be apprehended.

A method for applying these naphtha distillates to the disinfestation of houses has been developed, and consists essentially in spraying the walls and ceilings of rooms which have previously been made gas-tight by any of the usual methods of sealing. Special attention is given to likely harbourages such as skirting-boards, architraves, etc., a high-pressure hand syringe being used for spraying such harbourages. Gas masks with a suitable filter are worn during the process. To ensure satisfactory results it is important that sufficient vapour concentration be maintained, and for this purpose fumigation should not be begun at a temperature of less than 60° F. It is an advantage to work at as much above this temperature as is practicable.

The quantity of naphtha used in the experiments is on the basis of 1 gallon for each 750 cubic feet of room space. The rooms are kept sealed for eighteen to twenty-four hours, and at the end of this time are rapidly ventilated by opening doors, windows, fireplaces, etc. The vapour clears very quickly, and it is possible to enter a room after a few minutes' ventilation without experiencing any discomfort. It has, moreover, been shown that there is no tendency for a concentration of vapour to "build up" if after ventilation the doors and windows are again closed for several hours.

The desirability of a high initial temperature is emphasized, and only in very hot weather with air temperatures of 70° to 80° F. should pre-heating of houses be dispensed with. In the experiments a very effective paraffin stove, working on the primus principle, has been used, but in any case sufficient time must be given to warm walls, ceilings, etc., thoroughly. Owing to the inflammable nature of the naphtha, fires or other sources of heat must be extinguished, and, if portable, removed from the rooms before fumigation is started, and smoking and the use of naked lights must be prohibited while the naphtha is being handled in any way. The experiments indicate that after a house has been warmed it is advisable in most instances to spray the roof space before the rooms are treated.

* Abstract of a report to the Bed-bug Infestation Committee of the Medical Research Council.

Results

Successful results have been obtained in the disinfestation of upwards of two hundred houses and flats of varied constructional detail. Failure has been reported in a few cases, but this, we think, has been incidental to the development of a suitable technique for applying the naphtha. After fumigation for twenty-four hours dead bugs will sometimes be seen on the floors, but usually they will be found dead in their customary hiding-places —for example, behind skirting-boards, picture rails, etc.

The naphtha used is derived by the distillation of coal tar, and consists of a complex mixture of aromatic hydrocarbons and associated bodies, and the constituent or mixture of constituents which is toxic to the bed-bug is not known. The following specification has been drafted to govern the supply of coal-tar naphtha as used in these experiments.

SPECIFICATION FOR HEAVY COAL-TAR NAPHTHA

1. *Colour.*—Shall not be darker than a freshly prepared solution of 1 ml. of N/10 iodine in 1,000 ml. of distilled water.

2. *Specific Gravity.*—Not less than 0.835 and not greater than 0.910.

3. *Water.*—Shall be free from water and other visible impurities at 15.5° C.

4. *Distillation Range.*—Method as defined in B.S.I. Specification No. 479 for Coal-tar Naphthas.

Up to 160° C. not more than 5 ml.
Up to 190° C. not less than 90 ml.

5. *Flash-point (Abel).*—Not less than 105° F.

6. *Tar Acids and Tar Bases.*—Not more than 0.25 per cent. of tar acids and 0.25 per cent. of tar bases.

Further research into various aspects of the question of the use of heavy coal-tar naphthas for the destruction of bed-bugs is in progress, and new methods for more effective application are in course of development. As will be seen from these preliminary notes the use of coal-tar distillates for the destruction of the bed-bug is still in the experimental stage, but the results so far achieved are promising and indicate that further research on these lines may produce valuable results.

As was to be anticipated failures have occurred, not, however, owing to defects in heavy naphtha as a toxic agent for destruction of bed-bugs, but owing to defects in the methods of employing it for that purpose. If, therefore, those responsible for the management of house property adopt this method of treatment for eradication of bed-bugs it is important that they should realize that the technique of fumigation with heavy naphtha is still the subject of test and research, and that the cause of any failure is first to be sought in the method used. In the event of failure, the circumstances of the particular case should be carefully investigated, especially in regard to the temperature at the time of fumigation, to the sealing of the premises, and to the distribution of the vapour.

The eighth International Congress of the Haute Culture Médicale will be held at Algiers from March 25 to April 6. There will be sessions on tropical and subtropical diseases, syphilography and dermatology, cardiovascular affections, blood disorders, and social medicine. During the congress there will be a special commemoration of the pioneers in the campaign against malaria, and also excursions, receptions, and entertainments; in the first of these, which will be broadcast, Dr. P. H. Manson-Bahr will participate. At the end it is hoped to arrange visits to Morocco and Tunis. The travel arrangements are in the hands of Messrs. Cook, Wagons-lits, and further information can be obtained from the congress secretary, M. Tomarkin, Institut Alfred Fournier, 25, Boulevard Saint-Jacques, Paris, XIV.

SURGERY OF THE THYROID GLAND

LECTURES BY SIR THOMAS DUNHILL

The first two Lettsomian Lectures, under the auspices of the Medical Society of London, were delivered on February 15 and 24 by Sir THOMAS DUNHILL, K.C.V.O., whose general subject was the surgery of the thyroid gland.

In his first lecture Sir Thomas Dunhill remarked that the thyroid gland had only once before provided the theme of the Lettsomian Lectures, and that was twenty-four years ago, the lecturer being Mr. (now Sir) James Berry. It was just thirty years since he himself performed his first operation of partial thyroidectomy for toxic goitre. In the course of thirty years opportunities for testing theories and practice had multiplied, and he apologized to his audience for giving a few minutes to personal remininscences, which constituted his own historical background to the subject.

The circumstances of his first operation were of some interest. He had at that time about half a dozen toxic goitre patients in the out-patient department. One of these was a cook who had become far too ill to earn a living, and said that any risk was preferable to her wretched existence. A kind senior lent him a bed, and the operation was successfully performed on this woman, with the result that the other patients, one after another, asked him to operate on them.

Early Operations

At that time (1907) and for long afterwards surgeons were writing that resection of one lobe together with ligation of an artery of the opposite side was a cure for the majority of patients. He soon realized that his own experience differed from theirs, and that if anything approaching cure was to be obtained the amount of gland remaining had to be further diminished by resection of a portion of the second lobe. It became his practice, as he reported in the *British Medical Journal* in 1909, to resect as much as possible of both lobes. In those early days the amount of gland to be removed to obtain maximal relief could only be learned by experience. Sometimes even at the second operation an insufficient amount was taken and a third operation became necessary. Through such stages was it necessary to pass before it became the custom to perform the bilateral resection in one stage in all patients for whom it was deemed safe. His first operative death was in the same year (1907), and the superstitious might observe that it followed his thirteenth operation. It was due to the same cause as the majority of such deaths at the present day—namely, a misjudgement of the capacity of a very ill patient to withstand a double resection in one stage.

Evolution of the Goitre

Apart from inflammation and malignancy—and he doubted whether malignancy should be excluded—all goitres began as hyperplasia, and the different types of goitre were only stages in a pathological sequence, which was inevitable as soon as hyperplasia began. Probably the thyroid was singular among the endocrine glands in that normal physiological activities so readily crossed the borderline and became pathological. The commonest deviation from the normal was a symmetrical enlargement of the gland noticed most often at or soon after puberty. He said "or soon after" because hyperplasia at puberty might be slight with a quick return to normal. But when the hyperplasia began to be replaced by colloid storage increase in size became obvious and the stage was set for all the processes that followed.

The hyperplasia was induced by the normal demands of the body on a subefficient gland. Its significance was that in many instances recurrent phases of hyperplasia and involution led ultimately to secondary toxic goitre. The enlargement seen in adolescence might be scarcely more than physiological, though the fact of the enlargement indicated that the epithelium was vulnerable. The single nodule was usually of altogether different origin and character. It was an adenoma, a true neoplasm, not necessarily single but usually so. The statement had been made that thyrotoxicosis could exist without a goitre, but this was extremely rare. He suggested the terms "diffuse toxic goitre" and "nodular toxic goitre." The disease was essentially the same in that some stimulus had affected the thyroid epithelium and induced an alteration such that it became toxic.

In primary toxic goitre, occurring at all ages, in the majority of cases around the third decade of life, the stimulation was applied to a gland hitherto normal. The gland had its full complement of normal epithelium. Nothing hindered the whole of this from responding to stimulation—the "factory" was set for maximum output. Exophthalmos was usual because of the amount or toxicity of the secretion. Such a case was to be contrasted with the patient in whom a small goitre had been present for twenty years, becoming more toxic in the fifth or sixth decade. He could show every intervening stage, both clinical and pathological, linking up the two extremes. What he was not sure about was whether goitres apparently not toxic for many years and then becoming so might not have been mildly toxic from an early stage.

Incidence and Aetiology

The deaths from toxic goitre in England and Wales had increased from 812 in 1925 to 1,561 in 1935. This rise in a decade was rather startling. At Liverpool Dr. Robert Kemp had recently stated that thyrotoxicosis was by far the commonest condition in the female medical wards of the Royal Infirmary. The aetiology was difficult to determine. The multiplicity of the alleged causes might well make one doubt the essential significance of any of them. They ranged from emotional frustration to business anxieties, from motor accidents to endocrine imbalance, from infections to vitamin deficiency, from heredity to some personal or sex factor. Some factors, however, were so often associated with the inception of the disease and so influenced its course that they could not be ignored. Might it not be that the thyroid gland took the brunt of the buffeting of life? The endocrine glands were the delicate buffers and springs taking up and adjusting shocks. The factors to be considered were (1) the gland, (2) heredity, and (3) the stress of life.

It had already been shown that the gland was responsive to stimuli to an extent that could be demonstrated and made the subject of experiment. Few patients who carried a small goitre into middle life escaped the development of toxic symptoms. As for heredity, toxic goitre frequently occurred in several members of a family. He had several times seen it in three sisters. The quality of the protoplasm was handed down as certainly as the characteristics of the Hapsburg face. As for the stress of life, the changes that were induced in all subefficient glands by the biologically high but still normal demands of life were not in doubt, and efficiency might be vitiated in an individual by, for example, lack of iodine or vitamins.

For many years it was argued whether or not thyrotoxicosis was essentially a disease of the thyroid gland. Many believed it to be a disease affecting the body more widely. One physician went so far as to write that it was as logical to remove the kidney for albuminuria as to resect a portion of the thyroid gland for Graves's disease. There was much dogmatic statement on both sides, and there might not have been so much progress had not thyroid surgeons pressed their views with some vigour. It was necessary to take stock of the position and see where the truth lay. Shocks, anxieties, and infections were experienced and the hyperplastic gland resulted,

but these stimuli reached the thyroid by way of a hormone which originated in the anterior lobe of the pituitary gland, so that the thyroid, although the effect there was obvious, was only indirectly affected. Nevertheless it was the thyroid which produced the secretion causing the manifestations associated with toxic goitre.

Need for Continual Observation

The course of the disease was familiar, but the lecturer wondered whether the havoc which toxic goitre played in the life of the individual or the amount of life it wasted was realized.

He instanced the case of a woman patient whose practitioner had always accepted the condition as natural. She suffered always from epigastric discomfort, and sometimes vomiting, which was put down to persistent indigestion. The patient was always keyed up, driven by some remorseless internal restlessness. There was no placidity with her, and the nerves were always raw. She was a married woman, but in consequence of what the husband thought to be her temperament domestic happiness was ruined. Her doctor was not willing to admit that what he regarded as a simple goitre could be at the root of the trouble. At length she met a friend who had been through a similar experience, and by appropriate treatment it was possible to improve her condition, though, unfortunately, not to restore the domestic situation.

He instanced another patient whom he saw in September last. This man said that he did not feel ill, and asked to be allowed to go on with his sedentary occupation until after Christmas. He turned up at the hospital in February with a pulse rate of 140 to 150, and his weight was 6 st. 6 lb., a loss of 4 st. in four months on the top of the 1½ st. which he had lost previously.

Making every allowance for those restored to health by medical measures, there remained an incalculable amount of suffering and mortality that could be avoided. He was not recommending every case for operation, but he urged that any patient with this condition should never be allowed to escape observation, and at the first sign of any downward tendency active measures should be taken.

(To be continued)

THE HUNTERIAN TRADITION

ORATION BY LORD HORDER

At a meeting of the Hunterian Society at the Mansion House, London, on February 22 Lord Horder delivered the annual Oration, on "The Hunterian Tradition." The president of the society, Mr. H. L. ATTWATER, was in the chair.

Lord HORDER opened by saying that it was a compliment to him, a physician, to be asked to give an address on John Hunter, a surgeon; but Hunter was a physician as well as a surgeon, a better physician, indeed, than some of his contemporaries who practised in that branch of medicine, and he was more than either of those things; he was, first and foremost, a pathologist, a man who sought out the causes and nature of diseases. He was also a great anatomist and physiologist, making his researches so wide as to embrace the whole of the animal kingdom. But his chief distinction was in pathology, not so much a branch of surgery as its root, which before Hunter's day scarcely existed.

After he had chosen the title for his address he discovered that it had already been used by a Hunterian Orator before the Royal College of Surgeons, Sir D'Arcy Power, who had said that Hunter left a double legacy to medicine: first, the technical skill which he bequeathed to his pupils, and, secondly, the pathological trend which he gave to the study of surgery, and through which for the first time it became a living thing, moving away from pure empiricism and emerging as an art based upon accurate knowledge and guided by principles. Lord Horder said that it was the second of these which had been in his mind when he elected to speak on the Hunterian tradition. He was not qualified to say much on Hunter's technical ability as a surgeon. It might have been exceptional even in his day, when, a quick and accurate manual dexterity being of so much greater consequence to the life of the patient than in these days of expert anaesthesia and antisepsis, this was more general among surgeons than now. But Hunter's personal gifts in this direction did not appear to have attracted special notice, and were of far less moment than his achievement in opening up the vast field of pathology which laid the foundation of the surgery of the future. It did not seem that he had introduced much in the way of new operative procedures, though an exception was his method of curing aneurysm of the popliteal artery, saving thereby thousands of limbs and lives; in this operation he united the multitude of facts he had gained from his study of anatomy and physiology, his clinical experience, his post-mortem examinations, and his experiments on animals.

The Real Greatness of Hunter

The real greatness of Hunter, however, was that he called a halt to empiricism, dug the heels of reason in, and asked disturbing questions: What is it we are doing, and why? Here was the essence of the Hunterian tradition. In his attempts to answer these questions Hunter not only raised the level of surgery to a plane it had never reached before but gave impetus to inquiries that awakened the whole of medicine. What was surgery before Hunter? In these days when surgeons had taken such high rank among them there was a savour of quaintness in Paget's eulogium, when he said that before Hunter the surgeon held a subordinate place in the medical profession, generally inferior to the physician, who was a man of higher culture, an educated gentleman and associate of gentlemen. The physicians then were the teachers of all the medical sciences, teachers even of anatomy to the surgeons. But following Hunter in the pursuit of science surgeons soon became the chief anatomists, equal as physiologists and pathologists, and gained entrance into the ranks of the most educated classes. "Yes, Hunter did more than anyone to make us surgeons gentlemen"; so wrote Paget, himself one of the greatest gentlemen of them all.

Before Hunter came to London to join in the work of his brother William's dissecting school he was a cabinet-maker, and doubtless a very expert one. But had he been only a surgeon who collected specimens he would have remained in spirit a cabinet-maker. He was responsible for that other stream of influence which brought about the development of surgery in its physiological aspects and its investigations into the causes of disease, and this was the part of the Hunterian tradition which really mattered.

Hunter's Inductive Method

In his oration before the Royal College of Surgeons Sir Henry Morris had discussed whether the mind of this pioneer worked mainly by the process of deduction or of induction. Some critics had considered that those two philosophic methods were in a sort of conflict, leading to confusion of thought and obscurity of language, and appeared to have stressed unduly the tendency of the Scottish thinker to proceed deductively and of the English thinker to proceed inductively. It might be conceived that a Scotsman living in London would find his native mental equipment considerably embarrassed. But experi-

ence, of which there was quite a large amount, did not support that view. Of course Hunter was chiefly inductive in his methods. Most of the great minds in medicine had been inductive. Here Lord Horder for a moment traced the influence of Plato and the metaphysical outlook upon medicine. Had it not been that Hippocrates or the Hippocratic school was the contemporary of Plato and Aristotle and not their successor the world would probably have been denied not only the meagre discoveries of Hippocrates but the much more important stimulus which he gave by his example and what was termed the "Hippocratic method." But even Hippocrates was compelled to be largely deductive for the reason that medical science was not then born. The metaphysical outlook on nature paralysed medicine for more than a thousand years, and would have done so longer had not Francis Bacon burst open the prison door, through which, strangely enough, his namesake Roger three hundred years earlier had somewhat dangerously leaped. The stranglehold of the metaphysician was too great for Celsus and even for Galen, for though the latter made some anatomical discoveries of importance he constructed dogmas and theories from the most meagre facts, and such was his reputation that he dominated medicine all through that evil time. It was Bacon who led the way out of the morass, though he did not himself walk in it. He was the great interpreter of the change in thought and activity in relation to the world of nature. The world had agreed to date from Francis Bacon the systematic reform of natural philosophy.

An analysis of Hunter's excursions into the deductive method would show that this was not really suitable to his mind. Was not Hunter's mind in his face? Reynolds's masterpiece and the lovely statue in the Oxford museum alike showed the massive features, square protruding jaws, prominent nose, strong determined mouth, and peering eyes. Here was one who, like Browning's Paracelsus, "must know." Some of Hunter's generalizations from observation and experiment had proved themselves to be sound and even prophetic. For example, he concluded that anatomical abnormalities were an expression of arrest of development. He might be said almost to have anticipated Darwin in his teaching that structure was an expression of function. He was fond of teaching that blood was alive, and although he seemed to be flirting with an old fantastic speculation, he had nearly stumbled on a modern conception, and he got near to Pasteur and Lister in saying that air in itself had no power to cause inflammation.

Master and Pupil

Lord Horder read extracts from Hunter's correspondence with Edward Jenner, further to illustrate his mind. Jenner's own great discovery was not made until three years after Hunter's death, but the stimulus and encouragement which Hunter gave his pupil might well have played a big though indirect part in this first and perhaps greatest step in preventive medicine. What a contrast between these two men—the pertinacious Celt, raw and rugged in body and mind, lit by a constant flame of inquiry after knowledge and more knowledge, and the blue-eyed, handsome, easy, almost debonair Saxon, spending his days booted and spurred riding to hounds, and in the evening writing love verse. How Jenner must have resented at first the disturbing demands of his master, until he too became fired by the same spirit and found that the chase of nature's secrets was more engrossing than the sport of kings. To Jenner when he was disappointed in love came Hunter's consolation: "Let her go. Never mind her. I shall employ you with hedgehogs."

Of Hunter's teaching ability he must not stay to speak, but this, like his craftsmanship, was a minor matter. His pupils, with some exceptions, were not greatly impressed by his personality in the lecture room. Attendance was so scanty that on one occasion he had the skeleton brought in so that he might be able to say "Gentlemen." But those empty benches did not really matter. The few who listened were enough, and even the skeleton "talked" after Hunter's lecture.

So, after two hundred years, the Hunterian tradition came down to us. What were we doing with it? Could we carry it on? Institutions were doing their utmost to carry it on—the Hunterian Society, the Royal College of Surgeons, with its enlarged laboratories and the Buckston Browne experimental farm—but what of themselves as individuals? Had they Hunter's power of concentrated industry, his capacity for taking pains? Lord Horder said that when he watched his colleagues in the van of research he felt ashamed of the laziness of his own mind and the ease with which it yielded to discursiveness. Had they Hunter's inquiring mind, his lust to know for the sake of knowing, his intellectual courage, his spirit of accuracy, his divine discontent with any proof except that which carried inescapable conviction?

"And What About Ourselves?"

Perhaps they were saying that there was very little now to be found out. They knew all about hedgehogs. Did they? They were in a different part of the field, of course, for these pioneers had made a tremendous clearance. But there was probably as much to be done as ever, though of a different kind.

"To recognize the factors which go to make a balance or imbalance of the hormones and get control over those delicate adjustments—surely Hunter never had a task like that. To solve the riddle of endocardial infection, to understand the mechanism of high and low arterial pressures, to diagnose cancer before as yet it yields what we call physical signs or suggests its presence by recognizable deviations from the average in the radiologist's shadow pictures, to determine sex, to prevent a whole heap of diseases which once established we cannot cure—do we excuse ourselves because we cannot say all these stand open or we have the keys?

"Let us think of our tools, our technique, our team work, our researches. We have instruments of precision that Hunter never guessed at, and laboratories of which he never dreamed, and a corpus of knowledge to draw upon that was completely hidden from him. In his day there was little physics and less chemistry. So let us not try to escape from our tasks or our reasonable obligations. No doubt we are deflected a good deal from our main purpose. Man must be dominated by his age. Life has us by the throat. We are caught between instinct and reason. We have let go the former, but have not got a clear hold on the latter. We are not savage, but neither are we sapient yet."

He had hope that much might be done—if only the politicians could keep the ring. He supposed the politicians did know how vital these things were to all of them and to the future. When Pitt was asked to buy Hunter's collection he replied: "Why, I have not enough money to purchase gunpowder." History was repeating itself. But even dictators were transient if not trivial, whereas these other things were eternal. And surely it was better to know the behaviour of a cuckoo's stomach than to organize a nation for war.

"Can you not see this little man (Hunter stood 5 ft. 5 in. in his boots) with his shock of red hair, his exuberant vitality, his restless curiosity, making his attack upon the new world of facts, probing, measuring, comparing his tools, so elementary, and his method, all his own, grappling with Nature, laying

her under tribute, wrestling with her like Jacob with the angel, and saying, 'I will not let thee go except thou bless me.' Let us imagine him living amongst us—as he does—in the tradition he left behind him, and let us be worthy of him and of it."

The Orator was accorded a prolonged tribute of applause, and Mr. Mortimer Woolf, Sir Frederick Hobday, Dr. Ernest Young, and Dr. W. S. C. Copeman spoke to a vote of thanks.

SOCIETY OF RADIOGRAPHERS DINNER

The sixteenth annual dinner of the Society of Radiographers, a very pleasant function, took place on February 20 at the Holborn Restaurant, Miss K. C. Clark, the president of the society, acting as hostess. The company, who numbered more than two hundred, included representatives from the Midlands, Lancashire, Yorkshire, the West of England, and Ireland. It was stated that the society had topped the thousand in its membership during the past year, which had also seen the formation of two new branches, one for Scotland and the other for the South-West of England, which were represented at the gathering by their respective chairmen, Dr. J. Struthers Fulton and Mr. A. J. Walton. The president gracefully welcomed the guests, who included Professor J. A. Crowther, president of the British Institute of Radiology, Dr. L. A. Rowden, past-president of that body and of the society, Dr. G. W. C. Kaye of the National Physical Laboratory, and Dr. Angus Macrae, representing the British Medical Association, which, said Miss Clark, held a watching brief in connexion with the National Register of Medical Auxiliaries and had been very helpful and considerate to the radiographers. The radiographic societies of Manchester and district, Liverpool, the Midlands, Scotland, and Ulster were represented by their chairman or other officer, and some hospitals were represented, including King's College and the Woolwich Memorial. A message was received from the American Society of *X*-Ray Technicians extending greetings.

It was announced that the Archibald Reid memorial medal had been gained this year by Miss M. S. Milln of the Western Infirmary, Glasgow, for a noteworthy thesis. The first Stanley Melville Memorial medal—the late Dr. Stanley Melville was the second president of the society, the late Sir Archibald Reid being the first—was presented to Dr. J. Duncan White, the Stanley Melville lecturer for this year. The president also paid a tribute to the services of Mr. Melville, who has completed ten years as honorary secretary of the society. She said that although in the early period it was possible to cope with the work of the society by spare-time employment, the growth in membership had necessitated different arrangements, and Mr. Melville had now been made part-time secretary.

At the eleventh annual meeting of the Open Door Council, to be held at the Midland Institute, Birmingham, on Saturday, March 6, the first subject for discussion will be the Government's new Factories Bill, now before the House of Commons. Members of the general public are invited to the morning and afternoon meetings to hear women's opinions on this and other subjects of national importance. The text of the Factories Bill was issued on February 2; it is both a consolidating and a reforming measure, and comprises 152 clauses and four schedules. Part VI, dealing with the hours of employment of women and young persons, proposes important changes in the law. In general the weekly working hours for such employees are not to exceed forty-eight nor the daily working hours nine, exclusive of intervals for meals; but any factory may, so far as regards women and young persons of 16 and over, work overtime up to an aggregate of 100 hours in the year, subject to certain conditions. Workers under 16 are not to be allowed to work overtime or to be employed in a factory without a certificate of fitness.

WEIGHT LOST BY SWEATING

An interesting exchange of experiences and opinions on the subject of weight lost by miners in hot and deep mines as a result of sweating took place at the annual meeting of the Institution of Mining Engineers. Mr. A. G. R. WHITEHOUSE of the Mining Research Laboratory, Birmingham University, had confirmed experimentally some previous work showing that with the subject at rest sweating becomes progressively less copious, even when water is being drunk, and found in addition that this progressive decrease in the rate of sweating is much less marked when the subject is performing muscular work. The sweat glands are apparently liable to partial exhaustion with prolonged sweating, although during muscular work the exhaustion is less noticeable. As for loss of weight, one of Mr. Whitehouse's subjects, a medical student, showed a loss of weight of very nearly 5 lb. an hour. Throughout the experiments the subjects had seemed to be more comfortable when working than when at rest, although from the mouth temperature and the pulse rate the reverse would rather be expected. Mr. Whitehouse suggested that this might to some extent be a psychological matter, because to sit still in an experimental chamber for hours on end is rather depressing. From his experiments, he said, it seemed that the amount of sweating was not only due to a rise in body temperature, for with the same rise of body temperature as at rest the performance of muscular work considerably facilitated the sweating. It seemed probable, therefore, that some product of muscular metabolism was responsible for this, though the connexion might be a less direct one.

Mining Experiences

Some rather extraordinary figures relating to loss of sweat were quoted by mining engineers in the subsequent discussion. One of them stated that the sweat lost by miners in his pit varied from as little as 3 lb. a shift up to as much as 10 lb. He added that he himself when down in the mine lost 5 lb. in three hours, but that he had always got the whole of the weight back after dinner in the evening. He was accustomed to drinking copious amounts of weak tea. One curious circumstance was that the men lost the greatest amount of weight by sweating after the week-end rest. The man who lost 10 lb. on Monday would lose about 9 lb. on Tuesday, and progressively less until Friday, when his loss might be only 5 lb., but by the following Monday the heavy figures were again recorded. Professor NEVILLE MOSS of Birmingham mentioned that among fourteen men observed in a mine the sweating loss varied from 11 to 18½ lb. for a shift of five and a half hours' work, and he said that the best workers were those who sweated most profusely. He recalled one man from whose skin the perspiration poured off during the whole of the shift, and he turned out more coal than anybody else in the pit. Another engineer said that he had occasionally done work in a fairly hot pit, but with intervals during which he was working under ordinary temperature conditions, so that there was no opportunity to become acclimatized, and his experience was that during the first day or two in the hot mine he felt uncomfortable, and while wanting to sweat did not do so at all profusely. Later on profuse sweating took place, and the hot mine was then well tolerated. It was the experience of another mining engineer that any mine that was strange to him brought about a profuse perspiration, suggesting that there was a mental reaction as well as a physical cause, but once he was in a pit which was familiar the sweating was in no way marked. Finally, another engineer told the rather doleful story—without a moral—of a miner who had been one of the best workers in his pit and who usually sweated profusely. This man suddenly became a teetotaller, whereupon his capacity for work went down tremendously, and eventually he had to give up the pit.

Reports of Societies

RADIO-ACTIVE THERMAL WATERS

At a meeting of the Section of Physical Medicine of the Royal Society of Medicine on February 17, with Dr. GEOFFREY HOLMES in the chair, the subject for discussion was the indications for the use of radio-active thermal waters in Great Britain.

Dr. C. W. BUCKLEY said that some years ago an eminent physician called attention to the fact that all spas claimed to cure rheumatism if the advertisements of bathing establishments were to be taken at their face value, and that the claim of any and every spa to cure rheumatism was straining the credulity of all who knew the disease. But inasmuch as Bath and Buxton had attracted rheumatic patients for hundreds of years the waters of these spas might at least be considered to have stood the test of time. The action of thermal radio-active waters taken internally was diuretic and affected also the nitrogen metabolism. Externally in baths there was evidence that the emanation passed through the skin, but absorption through the lungs was more important. Dr. John Jones, who was evidently a great spa practitioner in his day, practising probably at Bath in the winter and at Buxton in the summer, described in 1572 the waters of both spas in a way not derogatory to either, and Floyer more than a century later also wrote of Buxton, and both these writers give a list of conditions in which the treatment was indicated. The list was not greatly different, allowing for certain changes of words—for example, by "leprosy" they probably meant psoriasis—from what would be given to-day. Both these writers placed gout in all forms in the forefront. They also included what would now be called fibrositis, rheumatoid and osteo-arthritis, delayed convalescence and stiffness remaining after rheumatic fever, gravel, phlebitis, colitis of some kinds, and certain forms of hepatic and digestive disorder, and beyond these, and in common with other systems of warm bathing, local and general, pelvic disorders in women and climacteric disturbances chiefly associated with high blood pressure. Some of the skin troubles for which the early physicians said the waters were suited might be dismissed because the washing of the whole body in those days was not very common, and the same results might have been obtained by a thorough bath in ordinary water at home. Rheumatoid arthritis was better treated at the radio-active thermal spas than elsewhere provided that rest was recognized as an essential part of the treatment and baths were used with the strictest attention to details. There was probably a specific effect calling for further investigation; this had been variously attributed to protein shock, auto-inoculation from foci in the joints, and histamine.

Clinical Experience

Dr. F. G. THOMSON said that various attempts had been made to explain the therapeutic properties of these waters on the ground of their chemical and physical constitution, and naturally when radio-activity was discovered this was invoked to explain what had been regarded as obscure. How far the various factors played a part had not yet been determined in such a manner as would satisfy a panel of scientific experts, but it was not necessary to demonstrate how any therapeutic agent exerted its effects before making a proper use of it. It might be said that the use of radio-active waters was empirical, and so it was, but so was the use of the greater number of drugs now employed.

There were three kinds of conditions which appeared to him as a result of clinical experience to be most suitable for this treatment. The first consisted of metabolic disorders—gout, obesity, mild glycosuria, early hyperpiesia, and the derangements incidental to the menopause. The relief of so-called hepatic glycosuria was often very striking. In the second place, rheumatic diseases had always been identified with spa treatment. The good results were due not only to the specific action of the waters but to the methods commonly employed. The deep pool bath with undercurrent douches had always been the most important feature, and this particular type of bath was of more value in chronic rheumatic diseases than any other. It was suitable for the majority of rheumatoid and osteo-arthritis cases. In cases of rheumatoid arthritis, apart from diminution of pain and stiffness, the general condition showed a remarkable improvement, either from detoxication, improvement in peripheral circulation, or relief of pain, or all combined. In the treatment of osteo-arthritis not more was to be expected than relief of pain and possibly some arrest of the progress of the condition. The third class of cases consisted of diseases of the urinary tract. Owing to their powerful diuretic effect radio-active thermal waters were of use in catarrhal conditions of the renal pelvis and bladder. With regard to sterility in women, it was at one time the custom to send patients to Bath or Buxton in the hope of overcoming this condition, but the classic example was not a very happy one to cite. The queen of James II went to Bath, and whether owing to the waters or not was in due time delivered of a son. This son became the "Old Pretender" and the father of the "Young Pretender," Charles Edward, who caused a vast amount of trouble to this country and to Europe during a good part of the eighteenth century. So perhaps the less said about the value of Bath in this respect the better!

Is Radio-activity a Deciding Factor?

Professor SIDNEY RUSS said that spa waters often contained radium or radon, or both, but it was equally true that practically every river and lake also contained these elements. The proportions everywhere were minute. In a million litres of Bath or Buxton water they amounted to only one or two millicuries, and in the natural gases up to 33 millicuries at Bath. If any of the therapeutic effects were due to associated radio-activity it might be expected that the spa waters richest in these elements would be among the most sought, but this was far from the case. Sweden had many spas, but the healing property of these spas could scarcely be connected with their radio-activity because the drinking-water of Stockholm from the arterian borings in the granite was far more radio-active than the water of any one of the spas. He went on to describe the work by Dr. F. D. Howitt, Dr. E. C. Pillman-Williams, and himself, recorded in the *British Medical Journal* of January 30 (p. 208), on the physiological effects produced on patients by ordinary tap water containing measured quantities of radon. These workers had been forced to the conclusion that in cases of rheumatism no demonstrable change was found in the clinical condition through such treatment. Doses were used of radio-active gas in ordinary tap water ranging from one thousand to one million times as great as was found in the average radio-active spa water. When the great benefits which patients derived at spas were considered, due no doubt to the medical advice they obtained and the regime they followed in taking waters containing a considerable variety of chemical compounds which might reasonably be held to have some action on the body processes, it seemed a pity to drag in radio-activity. Medical men, especially those in charge of important spas, would be doing a service if they rejected a claim which led to exploitation by non-medical persons.

Dr. FRANK HOWITT said that it did not require a great knowledge of physiology to understand that the ingestion of small amounts of minerals and chemicals could alter the metabolism of the body. A slight swing over of the *p*H to the alkaline side might perhaps effect a good deal, and it was possible that spa waters contained the exact amount required to treat the fundamental disturbances of chronic rheumatism. He went on to give further details of the investigation into the action of radon introduced into ordinary tap-water. He had been able to find no clinical

advantage in any of the rheumatic conditions, endocrine disturbances, or other disorders which were mentioned in literature from time to time as being benefited by this agent. When testing the effect of doses far in excess of those of spa water certain alterations were found, some good, some bad, an alteration, for example, in uric acid metabolism, and, on the other side of the balance sheet, a damage to the erythrocytes. If the spa physicians could adduce laboratory evidence in explanation of the results which it was known they had obtained it would be of great value.

The Bath Reaction

Dr. GEOFFREY HOLMES said that in 1912 he began his balneological experience at a hydro where only tap water was used, and he was frankly surprised at the results obtained by the internal and external use of plain tap water without any drug treatment whatever. Later he took up an appointment as house-physician at the Devonshire Hospital, Buxton, and one day, after swimming about for twenty minutes in the large pool bath, he felt the most unaccountable drowsiness, which he afterwards learnt was the bath reaction. It convinced him that there was something in the effect of that particular bath different from any water he had been immersed in before. Undoubtedly there was a difference in spa water, and perhaps some spa practitioners, being at a loss to explain the difference, had hailed the discovery of radio-activity as a godsend.

Dr. J. B. BURT said that the easiest way to induce a sarcastic smile on the part of a London physician was to mention radio-activity in spa water. There were two schools of thought with regard to spa treatment. People in America, England, and Holland said that spa treatment was simply cleverly applied ordinary hydrology (tap water). On the other hand, the physicians of France, Germany, Austria, and Italy looked aghast if it were suggested to them that tap water and spring water had the same action. In these latter countries there were a large number of spas, and the experience of their practitioners must be greater than that of the average London physician. He had welcomed the paper by Professor Russ and his colleagues in the *British Medical Journal* because it had cleared away a certain amount of "rubbish" talked about spa treatment. As far as the emanation was concerned he thought it extremely doubtful whether, except in gout, there was any effect, but it was only fair to point out that spa water in a typically radio-active spa like Buxton or Bath was in quite a different category. Radium emanation, he thought, gave only the alpha rays, but at these spas all the breakdown products from uranium to lead were found. Not only alpha but the extremely powerful beta rays were given off, and altogether the conditions were entirely different from those of experiments in which tap water was impregnated with radon. Professor RUSS explained that if radon was in water there was essentially the same radiation as with radium—not only alpha rays but beta and gamma rays.

A Question Still Obscure

Dr. LEONARD WILLIAMS said he had come to the meeting to listen to something new, and had not heard it. It seemed to him that it was not possible to talk about spa treatment as if it were only a question of climate or douches. It was a composite effect of all these factors which produced the results. He knew nothing about radium, but he did know something about Bad-Gastein, where there was an element in the waters which could not be accounted for by their chemical composition. That was insisted upon a great many years ago by von Liebig, who investigated these waters; he found that there was a *tertium quid* which could not be explained by any chemical process—whether it was radium he did not know, but it did at any rate offer some explanation of the hitherto inexplicable. The radium might be of the nature of a catalyst. After all, what went on in Nature's laboratory was very different from what went on in the laboratories of Middlesex Hospital.

Dr. L. C. HILL mentioned that some years ago he spent a "very miserable month" in going through the literature, mostly Continental, recording the experiments carried out in this field. He found nothing but rubbish, deductions not worth the paper they were written on, save for one experiment, which seemed worth quoting. At Wildbad some twenty or thirty cases of fibrositis were being treated in the late autumn when a change of weather occurred, with freezing of the pipes conveying the spa water to the bathing establishment. The establishment thereupon turned over to the town water. The patients, about 70 per cent. of whom had been showing the bath reaction, immediately showed it no longer, and all made remarks indicating that they felt a distinct difference—an improvement, in their view, because they lost the feeling of lassitude and tiredness when taking the baths. A week later, when the spa water could again be used, the bath reactions reappeared as usual. Dr. A. R. NELIGAN argued that as radium in large amounts was manifestly able to produce striking effects, it was logical to assume that even the minute quantities in thermal springs were not without some favourable action.

UTERINE PROLAPSE

At a meeting of the Section of Obstetrics and Gynaecology of the Royal Society of Medicine on February 19, with Mr. CLIFFORD WHITE in the chair, the operation for prolapse was the subject of two communications followed by a discussion.

Modified Gray-Ward Operation

Mr. EVERARD WILLIAMS, with the aid of a series of excellent photographs, described a modification of the Gray-Ward operation for complete procidentia. He reminded the Section that the principle of the Mayo technique for the cure of cystocele accompanied by prolapse was the same as in the interposition operation. The uterus was removed and the broad ligaments were sutured together, interposed under the bladder, and anchored to the vagina in the same way. In the experience of Gray-Ward the weak point in the operation was that an otherwise perfect result might be impaired by the subsequent development of enterocele or high rectocele. This was due to the extensive stretching of the posterior segment of the pelvic fascial supports which was usually found in complete procidentia. The Gray-Ward technique consisted, in addition, of the removal of the pouch of Douglas and the shortening and approximation of the utero-sacral ligaments. In the modification described by Mr. Williams still further attention was paid to the dissection of the posterior segment and the definition of the layers of fascia. This was accomplished by the inclusion of the necessary posterior colpo-perineorrhaphy in one step with the hysterectomy and the complete reversal of the order of procedure. The dissection began from behind, at the posterior commissure of the vagina, and not from the front below the urethra, as in the technique followed by Gray-Ward. Mr. Williams described a small series of cases operated on over the last five years.

The Transposition Operation

Mr. J. ST. GEORGE WILSON showed a film, in natural colour photography, of the transposition (interposition) operation. He said that the nomenclature was somewhat indefinite. The name "interposition" was first suggested by Wertheim, and later "transposition" was proposed. Most writers in America associated it with the name of Watkins, and European writers with the name of Wertheim. He gave a brief history of the operation, bringing the story down to a paper by Everett in 1935 recording 117 cases operated in the Johns Hopkins Hospital, with four recurrences, the author comparing it

favourably with treatment by vaginal hysterectomy and colporrhaphy. The indications for the operation were a large cystocele with a large prolapsed uterus in a woman past the menopause. The operative technique was practically the same as described in Professor Blair-Bell's *Principles of Gynaecology*. In the majority of cases the posterior vaginal wall was repaired together with the introduction of mattress sutures in the perineum.

The advantages of the operation in cases of large anterior vaginal prolapse were that it gave greater support to the bladder and anterior part of the pelvic floor than could be afforded by an anterior colporrhaphy. It was mechanically impossible for the bladder to sag down again, so that the recurrence of anterior vaginal prolapse was extremely unlikely. In frail, debilitated women, whom it was dangerous to keep so long in bed after an anaesthetic, transposition could be done by itself and the women be out of bed within a week without unsatisfactory results. The disadvantages of the operation were that the peritoneum was opened, with slight added risk—the only death in his series had been due to septic peritonitis—and that the operation could only be done safely after the menopause. If done before the menopause great care must be taken to remove the Fallopian tubes or otherwise sterilize the patient. Again, in the event of the necessity of hysterectomy later on the operation was made more difficult. He had carried out the operation fifty-two times with, as stated, one operation death. Of the thirty-five replies received to an inquiry among patients on whom the operation had been done for a longer period than six months, twenty-nine testified to functional cure. Three had symptoms—two of dyspareunia and one of backache; one of the patients with dyspareunia had stenosis and the one with backache had enterocele.

General Discussion

Mr. R. H. PARAMORE, speaking with regard to Mr. Williams's communication, said that in all cases of marked prolapse it was very necessary to get rid of the redundancies of the vaginal wall, which could easily insinuate themselves into the aperture. He did not believe anyone would succeed in this operation unless the pelvic floor musculature was in an efficient functional state. During the period 1922–31 he had performed the interposition operation forty-four times, and though he had not sent round an inquiry as to the after-results, he was under the impression that the operation was followed in the great majority of cases by success. It was specially an operation for women past the child-bearing period.

Professor JAMES YOUNG considered it very important to recognize that no reconstruction directed to the repair of prolapse could possibly succeed unless it had as its underlying basis the recognition of the importance of the muscle. With regard to rival types of operation he considered that no one type availed for all cases. Those who had studied the results of the Donald-Fothergill procedure would probably feel that with that operation there was as high an incidence of success as was to be expected of any.

Mr. V. B. GREEN-ARMYTAGE congratulated Mr. Everard Williams on his courage on coming "amongst the Fothergillians." He considered it a very important thing to separate the base of the bladder completely, otherwise there was a tendency to stretch the trigone of the bladder, with unfortunate results. He also noted Mr. Williams's reference to the utero-vesical fold. If this fold were sutured too far back on the uterus the floor of the bladder was below the level of the trigone, with the same result as in a prostate case—residual urine and stone. Great care should also be taken where the surgeon put the fixation suture which went from the vagina through the uterus. If it was put through the uterus too low down the uterus tended to become acutely anteflexed; if too high up it tended to bulge and the patient came back with dysuria. The uterus in some of these patients was long, and if the suture was put through the fundus it was likely that the patient would return with some form of dysuria or frequency. The lower suture should go through at the angle of junction of the cervix with the body of the uterus. Finally, he pleaded that a self-retaining catheter be put in for forty-eight hours until the patient regained control.

Professor J. M. MUNRO KERR said that the interposition operation was ideal in cases of elderly women with cystocele, just as the operation which Mr. Everard Williams had described was ideal in certain cases of prolapse of the posterior vaginal wall. He had had the pleasure of seeing Mr. Williams carry out this operation a day or two previously and had been very much impressed with his technique. He had tried the Mayo operation in a few cases and the Gray-Ward operation in a few, but for certain cases—he would not say all—the technique advised by Mr. Williams was a distinct advance. The special point in his technique was that the utero-sacral ligaments were approached from below, giving, he thought, a much better hold than would be afforded by working from above downwards. He begged gynaecologists not to pit one operation against another, but to select the operation for the particular case.

Dr. J. P. HEDLEY said that rectocele practically never occurred after the Fothergill operation. Enterocele was a different thing altogether. These operations of tightening up the ligaments were all very well, but he had done them from above with no success at all. Mr. LEAROYD WALKER related his experience with a patient who had become pregnant after an interposition operation in Vienna. The patient went to term, and he carried out a Caesarean section. Although the case gave rise to a good deal of anxiety it turned out well. The incision was somewhere well down the back of the uterus, and the opening of the internal os about three-quarters up the posterior wall of the gestation sac.

Mr. EVERARD WILLIAMS replied that he was not contending that his operation should be done to the exclusion of any other. He dissociated himself from the Manchester school, who could "see 2,000 cases of prolapse and do 2,000 Fothergill operations." No operation was completely successful in hundreds of cases. Mr. ST. GEORGE WILSON said that formerly in America the interposition operation had been done on women of all ages, but he thought it was now carried out only after the menopause or at least the patient was sterilized. It was not a good operation before the menopause. In the event of carcinoma of the body of the uterus he imagined that it would mean a struggle to get it out, and he recalled the bitter comments of a gynaecological surgeon in such a case on people who did interpositions. With regard to the perineal body, he thought this a very much overrated structure from the point of view of the support of the uterus. He was also against the self-retaining catheter. It would be better to carry out repeated catheterization.

Self-administration of Nitrous Oxide in Labour

Mr. CHASSAR MOIR exhibited a new type of apparatus for the self-administration of nitrous oxide gas during labour. The machine differed from the automatic machines previously introduced by supplying full strength gas. Labour pains were intermittent, and the patient was not to be expected to go on inhaling a gas-air mixture during intervals between the pains. The success of analgesia was determined by the amount of gas the patient could receive in a very short time. Experiment had shown that if pure gas were inhaled for twelve seconds—that is, over two deep breaths—the effect was considerably greater than with the usual method of using diluted gas over a longer period. Safety was ensured by limiting the absolute amount the patient could inhale at one time. This was done by means of a reservoir containing only enough gas for two deep inhalations, and then refilling very slowly, taking a minute to do so. The number of patients so far observed with these machines was 120. Cyanosis, usually quite slight, had been seen in only five cases, and there had been no harm to mother or foetus

Dr. R. J. MINNITT expressed some scepticism as to whether the required analgesia could be obtained in two breaths. Mr. D. H. MACLEOD asked whether the analgesia was sufficient for the delivery of the head. Professor JAMES YOUNG said that he had found the method give more perfect analgesia than any other of the kind. Mr. MOIR replied that patients in labour were apprehensive and perhaps not in full control of respiratory function, but if the reservoir could not be emptied in two deep breaths it certainly could in three. He did not think the machine could be depended on until the end of labour, though a few patients had continued to clutch the apparatus and had been delivered quite successfully under the influence of the gas.

Ocular Changes in Pregnancy

Dr. GRACE JONES read a short communication on the ocular changes in normal and hypertensive pregnancy. It was based on an investigation of the retinal condition in 500 normal and 144 hypertensive cases. Of the hypertensive cases ninety had been re-examined five months to two years after delivery. The higher the blood pressure and the longer the duration of toxaemia the greater was the amount of retinal involvement. The subjective signs, on the whole, were few. The most common symptom was the seeing of spots and flashes of light, also dimness of vision, distortion of images, occasionally discomfort, and rarely pain. The ocular picture included changes in the disk, retina, and vessels. Swelling of the disk was the first change to be noted in the majority of cases, the swelling being due largely to oedema. The whole fundus tended to have a steamy or hazy appearance. The 144 cases of hypertensive pregnancy had been subdivided into three groups for the purpose of the investigation—namely, cases of moderate and of severe hypertension, and cases of eclampsia. Four arbitrary grades of retinal involvement were marked: mild oedema of the disk of the retina, marked oedema, small cotton-wool patches of exudate and haemorrhagic areas in the retina, and diffuse retinitis of the albuminuric type.

In cases under medical care retinitis should never be allowed to develop, and the first sign of exudate or haemorrhage was an indication for immediate induction of labour. To prevent retinal involvement and subsequent nephritis all cases of toxic pregnancy should be induced after symptoms had persisted for fourteen days. Of the ninety cases re-examined 21 per cent. showed residual chronic nephritis or chronic hypertension. Of these one in seven with normal fundi or with early retinal involvement showed residual lesions, and four out of five of those with advanced retinitis. The prognosis as regards vision in cases with retinitis was reasonably good.

HAEMORRHAGIC DIATHESIS

A symposium on the "haemorrhagic diathesis" was held at a meeting of the Manchester Medical Society on February 3.

Dr. J. F. WARD said that although the term "haemorrhagic diathesis" usually signified the group of purpuras it was also applied to other conditions in which repeated haemorrhages occurred from capillaries, either spontaneously or as the result of minimal trauma, and included the haemorrhagic disease of the newborn and haemophilia. These various conditions differed in respect of hereditary influences, the most frequent site of haemorrhage, coagulation and bleeding time, and the number of platelets in the circulation. Varying figures given for the coagulation time by different workers were due chiefly to the lack of a uniform and satisfactory method of estimation. Haemorrhagic disease of the newborn was a deficiency disease, as it was satisfactorily treated by injections of whole blood, but the missing factor was not known. In scurvy the haemorrhagic tendency was clearly due to lack of vitamin C. It was doubtful if true haemophilia ever occurred in the female sex, although cases were reported in which it seemed possible. Foulis and Crawford's case was difficult of explanation unless it were due to marriage of a haemophiliac with a female "carrier." Pseudohaemophilia differed from true haemophilia, and some of the reported cases were probably examples of inherited purpura. No treatment was known that would cure haemophilia; temporary arrest of haemorrhage was more satisfactorily obtained by blood transfusions, and in the case of external haemorrhage application of the venom of Russell's viper, which shortened the coagulation time and would be used in high dilution without diminishing its potency. Timperley and Naish's treatment with egg-white or mucic acid was on trial and had given promising results in their cases.

Primary and Secondary Purpuras

Dr. JOHN F. WILKINSON discussed the non-familial haemorrhagic states or purpuras. After considering the main features of these and classifying them into primary (idiopathic) and secondary purpuras he dealt in detail with the primary purpuras represented by Werlhof's purpura haemorrhagica and by the Henoch-Schönlein purpuric syndrome. The features of purpura haemorrhagica were the occurrence of haemorrhages or purpura in or from the skin or mucous membranes, with a reduction in platelets, prolonged bleeding time, normal coagulation time, and non-retractile blood clot. The initial manifestation might be epistaxis, haematuria, haematemesis, melaena, or intracranial haemorrhage, and case records were cited to illustrate this. Spontaneous remissions were common, and there was a tendency to seasonal onset of symptoms. Dr. Wilkinson then described the blood changes in this group of purpuras and indicated their importance in association with the clinical findings in making a diagnosis and deciding upon the correct lines of treatment. The various forms of treatment were assessed and the value of splenectomy in association with blood transfusion was demonstrated with the aid of case records. The indications and contraindications for splenectomy and the need for choosing the right moment for operation were then considered.

As distinct from these purpuras the group represented by the Henoch-Schönlein syndrome was less constant. The condition appeared to lie between the urticarias and the purpuras. As a rule the blood findings were normal. It was clear that Henoch's purpura and Schönlein's purpura were not distinct entities but merely varieties of the same syndrome. Purpura was not the predominating symptom. The condition was usually seen in girls and lasted throughout life with remissions and relapses, but the symptoms might change in any individual at different times, the main ones being pyrexia, pains in the joints, gastro-intestinal symptoms (nausea, vomiting, colic, diarrhoea, blood and mucus in the stools), angioneurotic oedema, and so on. Treatment was unsatisfactory.

Dr. Wilkinson concluded with a discussion of the importance of vitamin C in relation to the purpuras. In the subsequent discussion Dr. WILLIAM BROCKBANK referred to two cases of purpura haemorrhagica that had responded to splenectomy and were well several years later. Dr. C. P. LAPAGE said that he had had good results with potato cream in the treatment of infantile scurvy. Dr. REID again emphasized the difficulties of estimating accurately the bleeding and coagulation times and described a method he had employed with success; he also referred to a case of familial telangiectasis under his care.

The Belgian Society of Gynaecology and Obstetrics, which administers the funds of the International Foundation of Gynaecology, offers a prize of 10,000 francs for the best work published during the last four years in one of the official languages of the International Congress of Gynaecology. Further information can be obtained from Dr. Max Cheval, Rue Alphone Hottat 16, Brussels.

Local News

ENGLAND AND WALES

Maternity and Child Welfare

The seventh English-speaking Conference on Maternity and Child Welfare, of which Queen Mary is Patron, will be held in the Great Hall of British Medical Association House, Tavistock Square, W.C., on June 1, 2, and 3, under the presidency of the Minister of Health, Sir Kingsley Wood. The conference has been organized on behalf of the National Council for Maternity and Child Welfare and certain of its constituent bodies by the National Association for the Prevention of Infant Mortality, in co-operation with the Maternity and Child Welfare Group of the Society of Medical Officers of Health, which will also hold a clinical course for medical practitioners on May 30 and 31. The subject for discussion throughout the conference will be "The Further Evolution of the Maternity and Child Welfare Movement throughout the British Empire and in the United States of America," and the following aspects, among others, will be included: provision for the care of mothers and children; the future of preventive psychology in relation to maternity and child welfare work; nutritional problems in relation to mother and child; the education of parents in the care of their children; the chief health problems facing the administration of maternity and child welfare work—how they have to be overcome or what attempts are being made to overcome them; the training of health workers; the special problems of rural areas, and of orphans, refugees, and destitute children. The conference is open to all who are interested in maternity and child welfare; the fees for full membership, including the receipt of printed matter, are £1 1s. per member, or in the case of two or of three members representing the same local authority or voluntary organization, 15s. and 14s. each respectively. Application for tickets, with remittance, should be sent to Miss Halford, National Association for the Prevention of Infant Mortality, 117, Piccadilly, W.1.

It has been proposed to hold a maternity and child welfare exhibition at Woburn House, opposite B.M.A. House, and that as part of this exhibition there should be a section devoted to historic exhibits in connexion with maternity and child welfare. It is hoped that members of the medical profession might be able and willing to lend such things as early types of feeding bottles, cradles, charms, or other articles illustrative of the upbringing of little children in early Victorian times or earlier. Any exhibit lent would be fully insured and every care taken while in possession of the committee. Offers of exhibits may be sent to Miss Halford at the above address before the end of April.

Air-raid Precautions in London

A report was presented to the London County Council at its meeting on February 23 on the steps which have been taken to co-operate with the Government in the formulation of a scheme of air-raid precautions. Two officers of the Fire Brigade were trained at the Government civilian anti-gas school in Gloucestershire, and, receiving certificates as first-class instructors, have trained twenty-four other officers as instructors, and these are engaged in training the rest of the personnel of the Brigade. About half the 2,000 officers and men requiring training have been instructed. The question of first-aid posts for the immediate reception of casualties and of casualty clearing stations and base hospitals is being dealt with centrally by the Government for the metropolitan police district. The medical officer of health has supplied particulars to the Home Office of the bed accommodation and ambulance facilities which the Council has available; draft proposals have also been prepared for the utilization of some of the mental hospitals. The Government has not yet decided, however, how to deal with the problem of base hospital accommodation for London casualties, and further action by the Council must await its decision. Courses of instruction have been arranged by the Home Office at certain of the Council's institutions for the medical staff of the public health and mental hospitals to become acquainted with the measures to be taken to secure protection against gas and to decontaminate personnel and material. The medical staff thus trained will pass on their instruction to the nursing staff. Measures are also being devised on a volunteer basis to deal with the decontamination of the parks from the effect of gases, and, by the chief engineer, for the protection of the Council's pumping stations and other vital parts of the main drainage system. After mentioning other measures, such as the possibility of using sports pavilions as first-aid posts and the establishments of first-aid and decontamination rooms at County Hall, a reference is made in the report to the criticism directed by certain scientists and others against the effectiveness of the measures in which the Government has invited the Council to co-operate, but it is pointed out that the responsibility for the effectiveness or otherwise of the proposed precautions must necessarily rest not with the Council but with the State, and that the Council's duty in the matter is fufilled by giving, as it has given, the co-operation sought by the Government.

SCOTLAND

Dundee Mental Hospital

Dr. W. Tuach Mackenzie, physician-superintendent of Dundee Mental Hospital, has intimated his resignation from this post, which he has held since 1903. Dr. Mackenzie graduated M.B., Ch.B. at Aberdeen University in 1898, taking the M.D. degree in 1903. After holding resident posts he specialized in mental diseases, and was appointed first deputy medical superintendent, and later physician-superintendent, of Dundee Mental Hospital, and lecturer on mental diseases at University College, Dundee.

Health and School Clinics in Glasgow

Speaking at the annual meeting of the Glasgow Infant Health Visitors Association, Dr. A. S. M. Macgregor, medical officer of health for Glasgow, referred to the valuable work which was being done by public health clinics recently established by the corporation. The Town Council proposed to extend this scheme by building several new clinics in various parts of the city. A recently opened one at Provan had started dental treatment for expectant mothers, and this had proved a great success. At the Cowcaddens clinic the experiment had been tried of conducting classes in mothercraft for schoolgirls, who had shown great keenness in the subject; this work carried on at an impressionable age would undoubtedly produce good results in future. The infant mortality rate of 109 per 1,000 last year in Glasgow had been disappointing, and had been largely due to a widespread and prolonged epidemic of measles in the city.

The benefits that have accrued to the physical condition of Glasgow school children are emphasized by Dr. G. Arbuckle Brown, senior deputy medical officer of health for Glasgow, in the annual report of the education health service. This report deals with the year to July, 1936, and records that the average weights of the children in each of the six main age groups and the average heights in most of the groups were the highest recorded for sixteen years. There was a further fall in the incidence of rickets, and low percentages in the number of children notified to their parents as needing medical attention or

as having to be excluded from school on account of some disease. The medical officers during the year made 2,900 visits and examined 54,882 children in the ordinary schools and 1,903 in the schools for children who are physically and mentally defective. In addition, 14,965 children were examined at the request of teachers on account of some suspected defect, and 27,005 were re-examined as having been found abnormal. The numbers of children treated at the school clinics showed an increase of 12 per cent. over those of the previous year, this increase being due, however, to improved arrangements for examination rather than to any increase in diseases or defects. The total number seen and treated at the clinics was 79,843, and the defects included: diseases of the ear, 4,399; diseases of the eye, 4,324; diseases of the skin, 17,569; defective vision, 11,282; defective teeth, 26,020; operations on tonsils, 1,435; deformities for remedial treatment, 1,621; other minor diseases, 12,646. The housing conditions of school children were investigated, and it was found that the number of inmates in one-apartment houses had diminished from 5.1 in 1924 to 4.9 in 1936, although the average number of inmates was still excessive in the smaller houses of one or two apartments. Comparison of the figures for height and weight of children showed that these bore a direct relation to the sizes of the houses occupied by the families, and that there were increases this year in the average measurements for children in each size of house, the improvement being most marked at the ages of 9 and 13 years.

IRELAND

Gift to Belfast Hospitals

Various Belfast hospitals and charities are to benefit to the extent of £100,000 through the munificence of Sir George E. Clark and his brother, Captain H. Douglas Clark. The gift has been made in memory of their parents, and will be an additional stimulus to the further development of the selected institutions. The late Sir George Clark was one of the founders of the famous shipbuilding firm of Workman and Clark, which, with Harland and Wolff, enjoyed a great reputation among British shipbuilders for the high-class liners and vessels they produced. Outstanding among the numerous gifts is £15,000 to the paying patients block of the Royal Victoria Hospital, and a similar sum to the Belfast Hospital for Sick Children for the building and equipping of a paying patients department for children of all classes. £5,000 has been given to the Pathological Institute of the Royal Victoria Hospital and to the Mater Infirmorum Hospital. Among other recipients are the Benn Eye and Ear Hospital and the Ulster Hospital for Women and Children.

Irish Free State Medical Research Council

The first meeting of the Medical Research Council of Saorstat Eireann was held on February 16, when the following members were present: Professor R. P. Farnan (chairman), Professors J. W. Bigger, J. F. Donegan, W. J. E. Jessop, H. Moore, T. G. Moorhead, and J. M. O'Connor, and Dr. J. McGrath. The thanks of the Council were accorded to the Executive Council of Saorstat Eireann for facilitating the formation of the Council and for putting at its disposal an annual grant; to the Hospitals Commission for advice and assistance; to the Royal Academy of Medicine in Ireland, under the auspices of which the preliminary work was done; and to the directors of Hospitals Trust Ltd., who placed at the disposal of the Preliminary Committee their staff and premises and who bore all the expenses in connexion with the incorporation of the Council. The following officers were appointed: hon. treasurers, Dr. McGrath and Professor O'Connor; hon. secretary, Professor Bigger; solicitor, Mr. P. H. O'Reilly.

Correspondence

Mental Disorder and the Endocrines

SIR,—The relation between mental disorder and the activities of the endocrine glands, so ably presented by the openers, was the subject of discussion at a meeting of the combined Sections of Psychiatry and Medicine at the Royal Society of Medicine on February 9 (*Journal*, February 20, p. 404), but it related chiefly to the gonads. The subject is no new text, for Sir George Savage in 1890 described cases of hypothyroidism in association with mental diseases, as did Kocher in 1883, Ord in 1880, Gull in 1873, and Schiff as far back as 1859. Victor Horsley referred to the influence of the thyroid as a necessary hormone in the physiology of metabolism, and Halliburton referred to a nucleo-albumin filling up the normal thyroid —and containing iodine—which exercised a profound influence on the body.

The general symptoms following removal of the thyroid were fully described by Horsley, who referred to myxoedema in adults and sporadic cretinism in the young, both characterized by slow, clumsy movements of the heavy body with its overgrowth of connective tissue, and the thin and coarse hair, and also mental apathy, listlessness, inactivity, and depression —all of these symptoms improving after the administration of the gland. Cases of this type are not infrequent in asylums (now mental hospitals), and my notes refer to nine marked cases which improved so much that they were discharged from Claybury. One was readmitted owing to privation and inability to purchase the thyroid, but she was again discharged recovered. One, suffering for twenty years from diabetes (as a complication), could not take the thyroid owing to faintness, and it had to be discontinued. There are other notes which need not be detailed.

I should like to refer to the pituitary, one of the mysteries of the human body, insomuch as 8 grains should be able to exercise such an enormous influence on the tissues of the body, especially the bony structures. I think one of the first cases in an asylum was in Colney Hatch, the institution now so ably presided over by Dr. John Brander.

This was the case of a middle-aged woman admitted in 1884 with the unmistakable symptoms of acromegaly. She was under my care at the time, and was suffering from delusions of persecution, abnormal sensitiveness, irritability, headache, and vague lumbar pains. There was general enlargement of the bones of the limbs (the hands and feet) and of the bony skeleton, and the face was characteristic. Her sight was not affected, and there were no symptoms of subthalamic pressure. She lived for several years, but the case was so unusual that I invited several of the then staff of St. Bartholomew's Hospital to see her, but no diagnosis was reached. After her death a post-mortem examination was conducted by my successor, Dr. Cecil Beadles, afterwards one of the curators of the Royal College of Surgeons. He found a much enlarged sella turcica and a tumour of the pituitary, and he believed it was the first recorded in this country. Shortly afterwards Marie named the disease "acromegaly," and I sorrowfully record that I missed attaining immortality and an imperishable name!

The case of Dr. Leonard Mark, described by himself, is well known, and to-day the literature of the subject is extensive, especially in regard to cases of hypopituitarism and Fröhlich's syndrome, or hyperpituitarism and gigantism. No one has a wider knowledge of the pathology of the ductless glands than Sir Arthur Keith, and he may have among his notes the case I refer to.—I am, etc.,

London S.W.1, Feb. 20. ROBERT ARMSTRONG-JONES.

When is Abortion Lawful?

SIR,—Referring to a letter and a leading article in your issue of February 20 (pp. 393 and 418), I think that there can be no doubt that abortion, which, as the law stands, is undoubtedly criminal, has for many years been largely practised, and is probably now commoner than before.

It is true that great discretion is used in instituting prosecutions. It is extremely difficult to convict even the most notorious abortionists, who are, for the most part, not medically qualified. Some forty years ago I interviewed the Director of Public Prosecutions of that time in regard to advertisements which were then common, and which were obviously for methods of criminal abortion by drugs, etc. He told me of an enterprising policeman who laid a trap for a well-known abortionist and was himself badly caught. He took his own wife, who was pregnant, and asked him to procure abortion for her. The abortionist got his blow in first by charging the man with inciting him to commit a felony. The policeman had a bad time.

A notorious medical abortionist saw his patients once only. He used instrumental means to terminate the pregnancy, and told the patient to go home and call in her own doctor. He warned her that she must tell her doctor nothing about the operation. One such patient called in her doctor. He gave her every care, but she died, and instrumental injury was detected. As the patient had observed complete silence her doctor was in a most dangerous position, as there was no evidence that anyone else but he could have used the instrument. He had never heard of the abortionist and knew nothing of him.

Doctors are from time to time asked to procure abortion for patients, and refuse to do so. Not infrequently they are sent for at a later date to deal with unavoidable miscarriage. The patient in some cases proceeds to tell the doctor, in the presence of a nurse, how she succeeded in bringing about the miscarriage which he has to complete. The doctor, of course, maintains professional secrecy. It certainly looks, however, as though he might be regarded as *particeps criminis* with a patient guilty of criminal abortion.—I am, etc.,

Lingfield, Feb. 21. HUGH WOODS, M.D.

SIR,—Your leading article "When is Abortion Lawful?" in last week's *Journal* is not quite complete in its legal aspect. In 1929 an Act of Parliament was passed entitled "An Act to Amend the Law with regard to the Destruction of Children at or before Birth." This Act was passed to remedy a curious defect in English law, to which attention was called by Mr. Justice Talbot during the trial of a case before him. He pointed out that whilst it was criminal to destroy a child by procuring abortion or to kill it directly after birth (infanticide) it was no offence to cause the death of a child during the actual process of birth. The essentials of the 1929 Act are as follows:

Any person who, with intent to destroy the life of a child capable of being born alive, by any wilful act causes a child to die before it has an existence independent of its mother, shall be guilty of felony . . . and shall be liable . . . to penal servitude for life. No person shall be found guilty . . . unless it is proved that the act which caused the death of the child was not done in good faith for the purpose only of preserving the life of the mother. Evidence that a woman has at any material time been pregnant for a period of twenty-eight weeks or more shall be prima facie proof that she was at that time pregnant of a child capable of being born alive.

It is quite clear that the operation of procuring abortion is now legal under certain circumstances—namely, that it is done to save the life of the mother, and that the seventh month of pregnancy has been reached. This still leaves the main question of the legality of therapeutic abortion for preserving the health or life of the mother during the first seven months or for preserving the health of the mother after seven months in the same uncertain condition as it was before the passing of the Act. The law having made abortion legal under certain circumstances, it may well be argued that it is illegal under any other circumstances.

In my book on *Criminal Abortion* (Bale Sons and Danielsson, 1932) I cited at pages 22 to 24 a case which bears directly on the matter discussed in your leader. Although this occurred in France, it might just as readily have happened in our own country. It cannot be too strongly emphasized that no doctor ought under any circumstances to procure abortion on a patient unless he has obtained agreement of a colleague of repute to the performance of the operation.—I am, etc.,

Hove, Feb. 21. L. A. PARRY, F.R.C.S.

Specific Antitoxins for Gonococcal and Meningococcal Infections

SIR,—In the *Journal* of February 13 Dr. T. Anwyl-Davies described the specific antitoxin treatment of gonorrhoea. May I draw attention to a method of treating chronic gonorrhoea in women which effects an active immunization of the body and which was introduced fifteen years ago. By this method the body itself is called upon to produce the necessary antitoxins, which in chronic gonorrhoea are no longer produced by the tissues.

As a gynaecologist I have only studied chronic gonorrhoea in women. Live gonococci are injected intracutaneously in certain predetermined quantities. In contrast to the high temperatures frequently caused by the antitoxin employed by Dr. Anwyl-Davies, the injection of live gonococcal cultures hardly produces a fever. Usually only one single injection is required to heal chronic gonorrhoea. The inoculation is perfectly harmless, and there is no danger of a gonococcal sepsis being caused by the injection because the live gonococci are killed very quickly in the skin. Hitherto some 3,000 injections of this kind have been performed at the gynaecological and dermatological clinics in Berlin, Kiel, Königsberg, Wiesbaden, etc. Results have shown that about 60 to 70 per cent. of cases of chronic gonorrhoea in women can be cured by this method. This percentage is hardly reached with the antitoxin employed by Dr. Anwyl-Davies. At the Surgical University Clinic, Berlin, Professor Bier applied this method to a number of cases of acute gonococcal arthritis. Within twenty-four hours after the intracutaneous injection of the gonococcal cultures the patients were free from pain and able to move the affected joint. The cure of chronic gonorrhoea in women by way of intracutaneous injections of live cultures was only assumed when a negative finding of gonococci was maintained for one year after the treatment at least. As far as I know this treatment, according to the method outlined above, was commenced last year at St. Mary's Hospital.—I am, etc.,

London, W.1, Feb. 21. ALFRED A. LOESER.

*** With reference to Dr. M. H. Gordon's letter on this subject in last week's *Journal* (p. 414) our annotator writes: I have the greatest respect for Dr. Mervyn Gordon's achievements in connexion with the serum treatment of meningococcal meningitis, a field of work in which he has had a wider and more fruitful experience than any man living. I omitted reference to his work in discussing Dr. Anwyl-Davies's paper only because the two subjects seemed to me only remotely connected. The

whole literature of meningococcus and gonococcus "antitoxin" claims that they are something totally distinct in nature from any anti-bacterial serum, and indeed they are prepared and tested by methods quite different from those advocated by Dr. Gordon. His suggestion that filtrates of gonococcus culture really contain endotoxin is explicitly denied by Ferry himself, who states in his original paper (*J. Immunol.*, 1931, **21,** 233) that lysed cocci do not produce the skin reaction by which the presence of his "exotoxin" is deduced and recognized. It will be seen that there are wide divergencies here in belief as well as in method. In my opinion the whole of Ferry's work stands in need of confirmation and elucidation. With Dr. Gordon's plea for authoritative intervention in matters of this kind I am in whole-hearted agreement. It is supremely unsatisfactory that the production of therapeutic serum in this country should be undertaken only for profit: commercial considerations, though admittedly an incentive to research and improvement, can also act in more than one way prejudicial to the advance of knowledge. It is perhaps not generally understood that all but very few of the leading bacteriologists in this country are excluded from participation in serotherapeutic research by the fact that the largest animal at their command is the rabbit. The State Serum Institute which has brought international fame to Denmark could surely be emulated here, if only for research purposes rather than supply. It would then be possible for independent research workers, unfettered by the obligations of a commercial laboratory, to attack the fundamentals of such a problem as this.

Mandelic Acid in Urinary Infections

SIR,—In the interesting and helpful annotation in the *Journal* of February 20 (p. 396) in which you write: ". . . the real problem is the chronic case which, though rapidly responding to treatment, relapses (often with an acute attack) within a few days or weeks. Repeated courses of treatment only result in as many relapses . . ." a misunderstanding is possible, and your final remarks might lead physicians, without knowledge of this treatment, to give it up. It was emphasized in some of the original papers that treatment, after cessation of the acute symptoms, should be carried on for many months for from forty-eight to seventy-two hours every week, and my experience of many cases is that if this procedure is adhered to there are no relapses. Patients do not care to have to go on taking the medicine and adhering to the restricted fluid diet for forty-eight hours every week, in some cases for the rest of their lives, but I have had no difficulty in persuading them to do so, as, where the symptoms have been real, they are very grateful for the continuous relief from what is a very dreadful affliction. —I am, etc.,

Tain, Ross-shire, Feb. 21. E. K. MACKENZIE.

Hypochromic Anaemias and Iron Deficiency

SIR,—In the interesting paper by Dr. J. F. Brock which appeared in the *Journal* of February 13 (p. 314) the author refers on several occasions to my published work on the iron-deficiency anaemias, and draws certain deductions therefrom.

Dr. Brock bases his conclusion that 9 grains of ferrous sulphate is an insufficient dose of iron on the statement that only ten out of twenty-one cases treated by me responded satisfactorily to this dose by a rise in the haemoglobin level of 1 per cent. daily. Reference to my paper (*Edin. med. J.*, 1934, **41,** 99) clearly indicates that only eleven out of the twenty-one cases can be utilized for such an assessment—namely, Cases 1 to 11. The others, for reasons stated, must be excluded either because the dose was less than 9 grains of ferrous sulphate daily, or because of coexisting complicating factors, such as cancer, nephritis, and haemorrhage during treatment. Of these eleven cases ten showed an increase in the haemoglobin level of 1 per cent. or more daily, while in the eleventh case the haemoglobin rose by 0.86 per cent. daily, a figure which would be considered satisfactory by many authorities. In the experience of Professor Davidson and myself, comprising hundreds of cases of hypochromic anaemia, 9 grains of ferrous sulphate daily has been found to be a satisfactory dose in the great majority of cases.

I should like also to draw attention to a misquotation of the figure calculated by me for the iron loss during lactation. My figure for this loss during six months' lactation was 180 mg. (*British Medical Journal*, 1936, **2,** 523), not 750 mg., as quoted by Dr. Brock in the table on page 315 of his article.—I am, etc.,

H. W. FULLERTON, M.A., M.B., Ch.B.

Aberdeen University, Feb. 13.

Cancer of the Breast

SIR,—In 1924 I read in Mr. Duncan C. L. Fitzwilliams's book on the breast the following sentences:

"that cancer can grow out in a ring for a distance of six, eight, or more inches all round the growth—Handley gives distances of nineteen, twenty, and even twenty-two inches—to a subcutaneous nodule, and that the intermediate spread all disappears and leaves no trace is, in my opinion, not only incredible but absurd."

and—

"I can only conclude by saying that after giving very careful attention to all the writings and arguments on this subject I have not met a single fact which would support the argument in favour of permeation, as everything can be explained by the far simpler method of blood-borne or lymphatic emboli."

I realized then that I could not count Mr. Fitzwilliams among my supporters. That impression is strengthened by his recent letter (*Journal*, February 20, p. 416). But I have not hitherto replied to his criticisms because I had already published in full the facts and observations which drove me to the conclusions he finds so absurd. (*Cancer of the Breast*, 1922, second edition, Murray.) I also might have considered them absurd before I had studied the subject at first hand; Mr. Fitzwilliams still apparently has not done so. He is a clinician, not a histologist, and microscopical evidence appears to mean little to him, or so I infer from the fact that his book on breast cancer contains many clinical illustrations but only four microscopical ones, all borrowed.

He has studied the subject of dissemination in the forensic manner of a lawyer getting up a case. Barristers and judges avoid any first-hand observation and rely upon the verbal statements of witnesses. Mr. Fitzwilliams has "given careful attention to all the writings and arguments on dissemination," and as the advocate for embolic spread he presents his case with considerable skill in the form of a series of assertions, ignoring all the troublesome facts which confront him. The unshakeable rock upon which the permeation theory rests is the detection of the "microscopic growing edge" of permeated lymphatics at considerable distances from the primary growth—for example, in the deltoid region of the arm, or midway between the umbilicus and the ensiform cartilage.

In regard to blood dissemination I have never denied that it occurs. As a very rare event it may take place early. Usually it is late, and in a majority of cases there is no evidence that it occurs at all.

I was interested but puzzled by Mr. Fitzwilliams's new "axiom" that "radium is practically useless in inaccessible cancer: glands that can neither be seen nor felt are certainly inaccessible; we cannot even be sure of their existence in all cases." It is not the first time his statements have surprised me. It was he who made the discovery that the average life of a truth is twenty years. He is naturally perturbed that my views on breast cancer and its treatment have not been replaced by his own within that period.

I am indebted to my friend Mr. Geoffrey Keynes for correcting in his letter in the *Journal* of February 13 (p. 358) my not unnatural misinterpretation of an ambiguity in his letter of January 30 (p. 242).—I am, etc.,

London, W.1, Feb. 22. W. SAMPSON HANDLEY.

SIR,—I was very glad to see Dr. J. H. D. Webster's letter in the *Journal* of February 13 (p. 358). While I am only a general practitioner, it seems obvious to me that in order to achieve a higher survival rate in breast cancer some method must be employed of attacking the intrathoracic extensions of the growth which are beyond the range of the scalpel. I have had the opportunity in the past of examining breasts and axillary glands from cases in which the primary growth alone had been treated by radium. Extensive necrosis had occurred in the growth itself, but cell division, as evidenced by the great number of mitotic figures present, was proceeding in the glandular extensions at a much greater rate than that observed in cases treated by radical operation alone. I think that by now this stimulating action of radium is well recognized. Since intrathoracic extension occurs as soon as, or perhaps earlier than, the invasion of the axillary glands, is it not possible that the application of radium is as rational as the use of manure as a weed-killer?

I have not yet had the opportunity of looking into Dr. Webster's results, but from the tone of his letter I judge that they are encouraging. If for no other reason than that his technique is based on sound theoretical principles they deserve to be.—I am, etc.,

Lisburn, Feb. 16. W. A. PAGE, M.D.

Ludwig's Angina Treated with Prontosil

SIR,—The death rate from acute Ludwig's angina is so great and the methods one can use to prevent a fatal termination seem often so feeble that I feel no apology is needed to report the case given below. I fully realize that little can be proved by one case (fortunately in our area we rarely see one, and so cannot collect a series), but the results here were so rapid and dramatic that perhaps others would like to try the same remedy.

The man, aged 28, who had put up with the pain for a week, was seen with an acute and very offensive alveolar abscess of the right lower jaw. Trismus was very marked, and so was oedema of the parotid area. An *x*-ray showed a buried wisdom tooth, and on admission to our local hospital his condition was rapidly getting worse. Under gas and ether, with great difficulty, the tooth was extracted. Rigors followed, his temperature rose to 103°, and he became delirious and mentally confused. The oedema went up to his right eye and down to the level of the thyroid cartilage, with marked inflammatory signs as well. On the suggestion of the R.M.O. prontosil was tried, in addition to short-wave treatment for ten minutes at a time. After three doses his condition was greatly improved, temperature came down, and rigors stopped. A slight rise in temperature was immediately controlled by two more injections of prontosil. The local inflammation, which had suggested the necessity of external incisions, rapidly subsided. The improvement continued, and within three or four days trismus had disappeared sufficiently for him to eat some solid food, and his recovery has continued at a rapid pace. The swab from the alveolus showed a culture of pure streptococcus, not, however, haemolyticus.

The rapidity of the change from the acutely dangerous septicaemic condition to one which gave no anxiety has been the most remarkable feature of this case.—I am, etc.,

Hayle, Cornwall, Feb. 19. W. H. PALMER, M.B., B.S.

Prostatectomy by the Two-stage Method

SIR,—I have read with interest and some surprise Mr. W. K. Irwin's paper (*Journal*, February 6, p. 261) on prostatectomy by the two-stage method. I feel that as one who has made a special study of the various prostatic operations mentioned by Mr. Irwin I cannot allow his paper to pass without comment.

Six deaths in 158 patients (3.7 per cent.) submitted to prostatectomy is an excellent record, but it is a record which should be equalled by any competent surgeon, no matter what method he uses, always provided that he operates on no patient whose renal function does not come up to standard and whose cardiovascular system is sufficiently resilient to stand the strain of the operation with its associated anaesthesia. It is noted that in 89 per cent. of Mr. Irwin's cases on whom a two-stage operation was performed the second stage followed the first stage within fourteen days. It thus follows that in only 11 per cent. of his cases might a two-stage operation have been said to be essential. As I have stated above, the method of prostatectomy described by Mr. Irwin is no safer than any other method. It is the choice of the suitable patient and the degree of care taken with the preliminary treatment which really determines the mortality rate. I disagree with Mr. Irwin as to the necessity for a two-stage operation as I believe that a one-stage operation is the operation of choice.

The first stage (suprapubic cystostomy) should be replaced by continuous drainage by means of an indwelling urethral catheter. Mr. Irwin obviously dislikes this method of drainage and refers thus to the indwelling catheter: "To some patients [it] is an instrument of torture and to all a method of treatment conducive to sepsis." Such a statement might be believed by some of your readers lacking experience in the use of the indwelling catheter. It is not my experience. A soft rubber catheter, size 7 to 10, can be passed without difficulty and without pain in about 90 per cent. of patients. It is fixed to the skin of the penis by elastoplast adhesive, the parts previously having been shaved. The catheter is then connected by tubing led under the thigh to a sterilized bottle at the bedside. This bottle contains a measured quantity of antiseptic solution, in which the free end of the tube is immersed, thus providing a siphon drainage. A small swab soaked in acriflavine is inserted under the adhesive around the catheter where it issues from the external urethral meatus. This swab is changed daily. Finally the penis and the proximal part of the catheter issuing from it are rolled in a sterile gauze swab. The bladder is gently washed out through the catheter once each day with a weak solution of potassium permanganate followed by sterile water and then silver nitrate in 1 in 3,000 solution. The patient hardly knows of the existence of the catheter. He remains perfectly comfortable, and any sepsis present in the bladder is rapidly eradicated. Where gradual decompression of the distended bladder is necessary a Kidd's tube fixed to the end of the drainage tube is inserted into an empty sterile bottle fixed at the

necessary level. Wash-outs are not instituted until the bladder is empty. In the few patients into whom an ordinary rubber catheter cannot be introduced a stylet inserted into a rubber catheter of Harris type (Eynard) always overcomes the difficulty.

Compare the technique above described with that advised by Mr. Irwin—a major operation saved; no messy suprapubic box; no suprapubic tube with all its acknowledged dangers of sepsis and bladder lavage, not once but repeated two or three times daily. As to the prostatectomy operation itself little need be said. Those with any experience of prostatic surgery deplore the haemorrhage and sepsis notoriously associated with the Freyer operation (or "the blind operation," as Mr. Irwin chooses to call it). The haemorrhage may be controlled by packing the prostatic cavity. Mr. Irwin evidently removes this packing without anaesthesia (or is this the third anaesthesia he recommends?).

The method of prostatectomy advocated by Thomson-Walker is an improvement on the Freyer operation—that is a fact generally acknowledged among urologists in spite of Mr. Irwin. Harris's method (*Brit. J. Surg.*, 1934, **21**, 434) is a tremendous advance on any previously known. It involves a plastic procedure on the prostate bed, and therefore, I take it, this must be the plastic operation to which Mr. Irwin refers. It is not the method for the occasional prostatectomist, as considerable experience in bladder surgery is essential and not a little skill. It is obvious that Mr. Irwin knows little about the Harris method, or has been singularly unfortunate in his source of information. This is shown when he mentions that in the plastic method (Harris) "the bladder neck is sutured round the indwelling catheter." Harris himself repeatedly condemned this technical error. The sutures in the prostate bed are placed and tied, and the catheter, which is only *then* inserted, must be a loose fit in the re-formed prostatic urethra. That is only one of his misstatements (to call them nothing worse); his whole paper bristles with them.

Mr. Irwin's post-operative treatment seems devised to obviate or minimize sepsis. His description of bladder wash-outs through the suprapubic wound and later through the urethra by Janet's method, followed after the ninth day by the daily passage of a catheter per urethram "until natural micturition was resumed," is illuminating. After the plastic operation (Harris), which he so strongly condemns, no irrigation of the bladder is permitted, apart from two ounces of fluid occasionally run in through the catheter should there be any obstruction to drainage. In spite of such labours as those described by Mr. Irwin to eliminate sepsis it persists in 90 per cent. of patients after the so-called "blind operation." This I have proved by bacteriological examination of urine taken from patients operated on by various surgeons at varying intervals after operation. The most severely infected urines came from these patients on whom a two-stage operation had been performed. In contrast I have proved that within two months of the Harris operation the urine is usually sterile. Has Mr. Irwin ever made such an investigation on his patients?

The abdominal wound by the Harris technique is no larger than that described by Mr. Irwin, but the Harris wound heals by first intention; his obviously does not. Does Mr. Irwin wish us to believe that a wound in which healing is delayed is less likely to herniate than one healing by first intention? Mr. Irwin makes no reference to the average length of time which elapses in his patients between the operation and natural micturition with a permanently healed suprapubic wound. After the plastic operation (Harris) the vast majority of patients micturate naturally after the withdrawal of the urethral catheter on the tenth post-operative day, and their abdominal wound is by then soundly healed and remains so. Further misstatements on the plastic operation (Harris) are that patients so treated suffer from "vesical neck pockets in which urine stagnates" and "obstruction at the vesical neck." I have "followed up" my patients since I first performed a Harris operation in March, 1934. "Vesical neck pockets" are unknown, and so far as obstruction to micturition is concerned the patients themselves assure me that their urinary stream has the calibre and force they associate with youth.

If your readers have not had an opportunity of seeing a plastic operation (Harris) performed by a surgeon experienced in the correct Harris technique and of noting the amazing wellbeing of the patient immediately following the operation and the smooth, comfortable, and speedy convalescence, then I ask them to take the earliest opportunity of doing so, and meantime I ask them to reserve judgement on Mr. Irwin's statements.—I am, etc.,

Glasgow, Feb. 12. WALTER W. GALBRAITH.

Injection Treatment of Hernia

SIR,—The letters from Dr. E. W. Archer and Mr. Maurice Lee on the above subject which have recently appeared in the *Journal* show that at last we in this country are beginning to realize that operation is not the only cure for hernia. My experience of the last seven years in the injection treatment of hernia in selected cases (a most important point) convinces me that it is sound and should have a great future. The vast amount of evidence that has appeared in American medical journals in the last few years cannot be lightly thrown aside. Whoever reads it must be struck by the fact that all who have investigated and are using the method were sceptical at first but with increasing experience have become convinced of its value. There is a clinic at the University of Minnesota for this treatment, and Professor Bratrud tells me that he is impressed with the good results. Many who have witnessed Bratrud's work have become enthusiastic supporters of the treatment.

The late Dr. Ignatz Mayer of Detroit, whose technique and solution I use, claimed 98 per cent. of cures. His cases were, of course, carefully selected. He was either (1) a mountebank, (2) honest but grievously self-deceived, or (3) a great pioneer. Whichever be the correct answer it is in the public interest to verify or refute his statements. My own experience convinces me that his claim is justified. What failures I have had can be attributed to (1) faulty selection, (2) faulty technique, (3) lack of intelligent co-operation on the part of the patient. One patient of mine, who had a hernia of over ten years' history, the size of a foetal head, remains free of all symptoms for over four and a half years.

I should be very pleased to give anyone who is interested further details and references to literature.—I am, etc.,

ST. GEORGE B. DELISLE GRAY, F.R.C.S.Ed.

London, W.1, Feb. 20.

Sedimentometers

SIR,—The letters which have appeared as a result of Dr. Terence Lee's article in the *Journal* (October 24, 1936, p. 809) have shown that many of us have independently and almost simultaneously come to the conclusion that the old clinical method of measuring the sedimentation rate is unsatisfactory. In the November, 1936, issue of *Caduceus*, the journal of the Hong Kong University Medical Society, we published from this department the details of the method we have been using here for the past year or two.

Briefly it consists in setting the blood samples in Wintrobe's tubes and photographing the fall of the corpuscle meniscus

every six minutes, using a Leica camera. The film is developed and the readings read off from the negative by means of a lens or a dissecting microscope. The scientific advantage is that on the same sample the volume of packed red and white cells, mean corpuscular volume, and mean corpuscular haemoglobin concentration can all be measured. The technical value of the method lies in the fact that a large number of samples (in our apparatus twelve) can be investigated at the same time, and this should commend itself to laboratory workers dealing with large numbers of blood samples.

In the August issue of the same journal I discussed three other constants—namely, aggregation time, sedimentation time, and aggregate sedimentation rate—which are measured by this method, and I should be only too pleased to send reprints of these articles to anyone interested, and more than pleased to receive their criticisms of the arguments therein.—I am, etc.,

LINDSAY RIDE,
The University, Hong Kong, Feb. 4. Professor of Physiology.

Prevention of Silicosis

SIR,—It was with great interest that I read the letter of Drs. A. E. Barclay and Richard Fawcitt, and their tentative conclusion "that there must be at work some predisposing factor or factors which influence the incidence of silicosis." It is certain that many will look forward to the publishing of their findings supporting the hypothesis that dust diseases are (*a*) secondary to a probably infective primary condition, and (*b*) that this operates by impairment of the normal excretory action of the cilia.

Just as a puncture may result whether the pin be forced into the finger *or* the finger on to the stationary pin, so, as Dr. Goodfellow contends, *a priori* the lung tissues might be punctured by their surging movement over the sharp particles, although such sharp siliceous particles had themselves lost all momentum. It is certainly difficult to grasp, and on statistical grounds would seem "agin natur," that the most widely distributed of chemical elements, and a very inert one, should be poisonous to man even if introduced through the respiratory tract. On the contrary, it seems natural to associate with poisons great potential activity allied with rarity of distribution. And it must not be overlooked that even if silicosis were due to poisoning by silica, and not rather by bacteria introduced by silica to tissues predisposed, as suggested by Drs. Barclay and Fawcitt, the tuberculosis which often ensues is incontrovertibly due to the introduction of bacteria. If silica is even then still being added, then the silica particles will presumably play some part in introducing the tubercle bacillus—so why not initially?

It might even be that silicosis itself is a threshold form of tuberculosis—never otherwise met with—due to the possible modifying action of the silica particles on the tubercle bacillus, which they themselves are introducing. That is to say, that whilst the silica particles introduce the tubercle bacillus they slow down its progression and in many cases prevent its full course into the commonly recognized tuberculosis, finishing instead with a specific type of "tuberculosis" recognized as silicosis. May I also make the following suggestion.

Both silica and carbon are powerful adsorbents, but carbon is the more powerful of the two. Carbon also is much less hard than silica, and its particles will be relatively bland, less irritating, and much less liable to puncture than those of silica. The mechanism of the inception of silicosis may therefore be as follows. Silica particles before inhalation may adsorb from the air, where they are known to circulate, bacteria and other micro-organisms. If the tissues in the lungs are even slightly punctured or scratched by their relative movement with regard to the silica particles, however set up, such bacteria, etc., may be readily introduced. But the inhibiting effect set up by the simultaneous presence of coal particles—which was so strongly insisted on by the late Professor J. S. Haldane—might occur as a result of selective or rearranged adsorption by the stronger adsorbent—that is, carbon—of the bacteria first adsorbed by the silica particles, from the silica particles themselves. That is, on introducing coal particles the venue of the bacteria might be changed from its original site around the sharp cutting edges of the silica particles, ideally positioned for introduction into small wounds, to the non-cutting surfaces of the coal particles ideally positioned for non-introduction into the small wounds by being retained at maximum distance from them. In this case the possible slowing down of tuberculosis into silicosis by silica particles may be still further slowed until even silicosis were practically prevented. The result would be that, though the lungs were maximally clogged with mixed dusts, their destruction would be prevented, as contrasted with lungs less clogged with silica dust alone. Whether or not this is correct, it seems *a priori* much more likely that the cause of silicosis is mechanistic, physico-chemical (adsorptive), and bacterial than due to organic poisoning by the earth's most common element. For in the former case the various processes are known to exist and to be effective in certain ways, whilst in the latter the effects observed seem not even to be justified by expectation, and are, as it were, outside the "universe of discourse."—I am, etc.,

Leeds, Feb. 9. S. C. BLACKTIN.

Intraperitoneal Haemorrhage from a Graafian Follicle

SIR,—I was much interested in Mr. R. R. M. Porter's letter in your issue of February 6 (p. 301) on the subject of rupture of a Graafian follicle simulating appendicitis, as I have had a similar experience in the last few weeks with a member of my own household.

She had been complaining during the night of right-sided abdominal pain, and had vomited. When I saw her in the morning there was obvious tenderness and rigidity over the appendix region, and the temperature was 99.8° F. On the strength of these symptoms I sent her into hospital with a diagnosis of appendicitis. At operation the appendix was quite healthy, and the only thing found to account for her symptoms was a recently ruptured Graafian follicle which had escaped into the peritoneal cavity. In this case the rupture in the ovary was no longer bleeding, so there was no occasion to remove the ovary.

I had never heard of such an accident giving rise to symptoms of this kind before, and have been left wondering how common the association may be. One certainly would not think the accident itself can be a very rare one.—I am, etc.,

Portsmouth, Feb. 16. E. W. DEWEY.

An Oxygen Tent Service

SIR,—I read with much interest the letter on the oxygen tent service from Drs. Hilton, Pearson, and Poulton (February 20, p. 413). There are two points I would like to raise. The flowmeter supplied with the original tents issued was of the "dry" type, and its accuracy appears to be easily upset. As a result low oxygen concentration readings are obtained and the tent is quite wrongfully blamed. I have had experience of two other flowmeters.

one designed by Dr. Poulton (to be published shortly), and the other marketed by the British Oxygen Co.; both these are of the water-depression type, and appear to be more accurate. I suggest that wherever a tent is in constant use one of these flowmeters is kept to check the accuracy of the model fitted to the tent; for this purpose the inlet tube on the injector is stopped down with a cork and the outlet tube connected with the flowmeter.

The other point which I think of great importance is in the matter of running the tent. The service mentioned in the letter published on February 20 applies to small hospitals and other places which own no tent of their own; but it is essential that those hospitals which own a tent should ensure that they have easily available a member of their staff acquainted with the working of the tent. If this is not done the tent will be wrongly assembled and will be blamed for the poor therapeutic result.—I am, etc.,

Beckenham, Feb. 20. D. C. REAVELL, M.D.

Obituary

Dr. WILLIAM BRAMLEY TAYLOR, who died at Weybridge on February 12, aged 90, was for many years a prosperous and widely respected practitioner in Denmark Hill. He was apprenticed to his father, Charles Taylor, at Apothecaries' Hall, studied at Guy's, and was made free of the Society of Apothecaries in 1868. In 1869 he obtained the L.S.A., and in 1870 became M.R.C.S., thus holding the double qualification for general practice customary before the establishment of the Conjoint Board. He served for a while as assistant medical officer at Camberwell House, and then turned to private practice. His public spirit was shown by his work for the Royal South London Dispensary, and was recognized by his appointment as a justice of the peace for the County of London. Apart from his professional work his interests were social and literary. His father was an old loyal member of the Society of Apothecaries, and was Master in 1890. Bramley Taylor followed in his father's footsteps. In 1886 he joined the Friendly Medical Society—a dining club which was founded in 1723 to promote friendship between apothecaries, who in those early days had abandoned trade and confined their activities to medical practice. Taylor continued to attend the meetings regularly until he was elected to the Court of Assistants in 1905. Thereafter, so long as he was able, he gave all his energy and enthusiasm toward furthering the interests of the Society of Apothecaries. In 1910 he became librarian, and with great industry arranged the books and compiled a card index. In 1913 he published a catalogue of the books then possessed by the Society. In 1912 he was elected Master: after his year of office he continued his work in the library until 1930, when, owing to failing sight, he was compelled to resign. Shortly afterwards he retired from the Court of Assistants. His courtly manner, his enthusiasm, and his surprising energy will live long in the memory of the Society of which he was a member for so many years.

Dr. RUSTOM NUSSERWANJI COORLAWALA, who died in Hyderabad last November at the age of 56, was well known for his work in surgery and radiology. Born at Satara in 1880, he was educated at the Hyderabad Medical School and in Edinburgh, London, and Paris. In 1904 he qualified L.R.C.P., L.R.C.S.Ed., and L.R.F.P.S.Glas.; and in the next year took the Cambridge D.P.H. and the L.M. at the Coombe Hospital, Dublin. He obtained the diplomas M.R.C.S.Eng., L.R.C.P.Lond. in 1907, and the F.R.C.S.Eng. in 1909. He was also L.M.S.Hyderabad. He held at first clinical appointments in London hospitals, and in 1911 began his service under the Nizam's Government as house-surgeon in the Afzulgunj Hospital. From 1912 to 1933 he held professorial rank, first in ophthalmology and then in anatomy and surgery, in the Osmania Medical College. In 1922 he was appointed first surgeon at the Osmania Hospital, and was its acting superintendent from 1922 to 1929. During this time the new hospital was completed and opened under his active direction. Until February, 1936, when he was placed on the retired list, he was Household Physician to the Nizam and his family; in 1933 he accompanied Prince Huazzam Jah Bahadur on his tour in Europe, and subsequently received the title of Nawab. In 1935 he again travelled with the Prince in Europe. Dr. Coorlawala's chief interest lay in surgery, and the radiological advances in this respect made a special appeal to him. He contributed to the *Proceedings of the Hyderabad Medical Association* and the *Deccan Medical Journal*. In 1920 he was elected a member of the British Medical Association.

The late Dr. JOHN WILLIAM ROWLANDS, J.P., received his medical education at the Glasgow Royal Infirmary, and in 1879 obtained the diplomas L.R.C.P.Ed. and L.M. and L.R.F.P.S.Glas. and L.M. After holding the appointment of house-physician in the Glasgow Royal Infirmary he engaged in general practice in Llanaelhaiarn, Llanwnda, Glamorganshire, where he attained wide popularity and was greatly esteemed for his clinical ability and his invariable kindness and sympathy for all in distress. He took great interest in the development and social progress of the neighbourhood; for some years he served as a county councillor, and was a justice of the peace. Dr. Rowlands joined the British Medical Association in 1882. He was chairman of the South Caernarvon and Merioneth Division in 1909–10, and a representative in the Representative Body at the Annual Meeting of the Association at Belfast in 1909. He died at his residence in Llanaelhaiarn, where he had been in general practice for over fifty years, and had been medical officer and public vaccinator. His son, Dr. John L. Rowlands, practices at Llanaelhaiarn.

The death has occurred in London of Dr. LEONARD GREENHAM STAR MOLLOY, who was Conservative M.P. for Blackpool in 1922–3. He was born at Nass, Co. Kildare, in 1861, and studied medicine in Dublin, graduating M.D. of Trinity College in 1889. From 1891 to 1923 he practised at Blackpool, and thereafter in Monte Carlo and Harley Street. During the war he served in France and Belgium with the rank of major in the Duke of Lancaster's Own Yeomanry, and was twice mentioned in dispatches, and was awarded the D.S.O. Dr. Molloy was honorary consulting physician to the Victoria Hospital, Blackpool, to Rossall School, and to a number of charitable institutions. He was an honorary life member of the St. John Ambulance Association and a Knight of Grace of the Order of St. John of Jerusalem. He joined the British Medical Association soon after graduation, but resigned in 1913, during the early days of the National Insurance Act.

Dr. NOEL CHARLES BEAUMONT, who had been district medical officer for Stainland, near Halifax, for over a quarter of a century, died from pneumonia on February 21 at his home, Stannary House, Stainland, aged 63 years. He studied medicine at St. Bartholomew's Hospital, obtaining the M.R.C.S. and L.R.C.P. diplomas in 1901. He then served as junior and senior house-surgeon and anaesthetist at the Royal Portsmouth Hospital, and was for some time chief Government medical officer at Port Moresby, Papua. After settling down in practice at Stainland in 1909 Dr. Beaumont was appointed medical officer and public vaccinator for the district. He joined the British Medical Association in 1911, the year in which he married.

Universities and Colleges

UNIVERSITY OF CAMBRIDGE

Among the graces approved at a congregation held on February 20 was one abolishing the thesis for the completion of the M.B. degree, in accordance with recommendations made by the Faculty Board of Medicine (see *British Medical Journal*, February 6, 1937, p. 278).

The following medical degrees were conferred on February 20:

M.B., B.CHIR.—W. L. Petter, E. B. McDowall, J. F. Goodall, G. S. Steele-Perkins, C. Hardwick.
M.B.—E. E. Pochin, W. F. Richards.
B. CHIR.—G. O. Brooks.

UNIVERSITY OF LONDON

At a meeting of the Senate held on February 17, with the Vice-Chancellor, Mr. H. L. Eason, in the chair, Professor F. A. P. Aveling, D.Sc., Ph.D., was appointed a Fellow of King's College, and Professor Raymond Pearl, LL.D., Sc.D., Ph.D., was appointed Heath Clark Lecturer for 1937.

UNIVERSITY OF BIRMINGHAM

Dr. H. P. Newsholme, medical officer of health to the city of Birmingham, has been appointed professor of hygiene and public health in the University in place of the late Sir John Robertson.

UNIVERSITY OF LEEDS

At its meeting on February 18 the University Council appointed Dr. R. E. Tunbridge, at present medical tutor and registrar, to the new post of Reader in Medicine, and Mr. A. J. C. Latchmore as second surgical tutor.

UNIVERSITY OF GLASGOW

The Secretary of State for Scotland announces that the Regius Chair of Materia Medica in the University of Glasgow is vacant owing to the resignation of Professor Ralph Stockman, and that it is proposed to take steps to fill the vacancy. The professor will in future retire at the end of the academical year in which he attains the age of 65. Applications for the chair, accompanied by two copies of recent testimonials, should reach the private secretary, Scottish Office, Whitehall, London, S.W.1, not later than March 31. Particulars of duties, salary, etc., may be obtained from the same address.

The Services

LANGLEY MEMORIAL PRIZE

The Langley Memorial Prize, value £21, is open to competition among officers of the Colonial Medical Service who are serving, or who have served, in West Africa.

The prize will be awarded for the best paper submitted on a topic falling within one of the following subjects (special consideration being given to original work): (*a*) tropical medicine or surgery; (*b*) tropical hygiene and sanitation; (*c*) tropical entomology and parasitology.

Papers, which may consist of either published or unpublished work, must be delivered to the Secretary, London School of Hygiene and Tropical Medicine, Keppel Street, Gower Street, W.C.1, on or before October 1, 1937.

DEATHS IN THE SERVICES

Inspector-General JAMES HAMILTON MARTIN, D.S.O., R.N. (ret.), died at Ealing on February 14 at the great age of 95. He was born at Truro on August 8, 1841, the son of Hamilton Duckworth Martin, was educated at Truro Grammar School and at University College, London, and took the M.R.C.S. and L.S.A. in 1864. Entering the Navy soon after qualifying, he became inspector-general on January 1, 1900, and retired on January 1, 1902. He had a long record of war service. He was surgeon of H.M.S. *Nassau* during encounters with Sulu pirates, and was present at the destruction of Carang in 1872; staff surgeon in charge of transports during the Zulu War, 1879, mentioned in dispatches (medal and clasp); staff surgeon of H.M.S. *Thalia* during the Egyptian War of 1882, was senior medical officer in charge of transports, and received the thanks of the Admiralty (Egyptian medal and Khedive's bronze star); principal medical officer to the Royal Marine Battalion in Eastern Sudan in 1884, present at the battles of El Teb and Tamai, wounded, mentioned in dispatches, and specially promoted to fleet surgeon (two clasps); fleet surgeon of H.M.S. *Boadicea*, the flagship, and served as principal medical officer of the Naval Brigade landed under the command of Vice-Admiral the Hon. Sir E. R. Fremantle, K.C.B., commander-in-chief of the East India Station, for the punitive expedition against the Sultan of Vitu, East Africa, in October, 1890, mentioned in dispatches (general Africa medal, with clasp, and D.S.O.). He had received a Greenwich Hospital pension.

Major CHARLES EDWARD GREY STALKARTT, R.A.M.C. (ret.), died at Bury Hall, Alverstoke, Hants, on February 18, aged 71. He was born on August 31, 1865, the son of the late John Stalkartt of Chopra, Bihar, and was educated at Edinburgh University, where he graduated M.B., C.M. in 1886, and M.D. in 1890, also taking the M.R.C.S. and L.R.C.P. Lond. in 1889. While at Edinburgh he filled the post of prosector in the University dissecting rooms. Entering the Army as surgeon on July 28, 1891, after a period in general practice, he became major after twelve years' service, and retired on July 28, 1911. He served in the South African War in 1900, taking part in operations in the Orange Free State, including the actions of Paardeberg and Karee Siding, receiving the Queen's medal with two clasps. In September, 1900, he was invalided home in consequence of enteric fever. When the war of 1914–18 began he was recalled from the Reserve of Officers, and served as officer in charge of the base depot of medical stores in France, finally relinquishing duty in October, 1919.

Major JOHN MILO RYAN, R.A.M.C., died at Lahore on December 4, 1936, aged 44. He was born on June 7, 1892, and was educated at Trinity College, Dublin, where he graduated M.B., B.Ch., and B.A.O. in 1915. He took a temporary commission as lieutenant in the R.A.M.C. on November 8, 1915, became temporary captain after a year's service, and took a permanent commission as captain on July 1, 1919, becoming major on November 8, 1927. He served in the war of 1914–18. He had been a member of the British Medical Association since 1925.

Medical Notes in Parliament

In the House of Lords on February 22 Viscount Gage presented a Bill to amend the description of the persons with whom arrangements may be made under the National Health Insurance Act, 1936, for the dispensing of medicines, and it was read a first time.

In the House of Lords on February 23 the Regency Bill was read the third time and passed.

The Coal Mines (Employment of Boys) Bill was reported to the House of Commons from a Standing Committee on February 17.

The Geneva Convention Bill, which has already passed the House of Lords, was reported from a Standing Committee of the House of Commons without amendment on February 18.

The report of the Select Committee on Medicine Stamp Duties was presented to the House of Commons, with minutes of evidence, on February 18.

In the House of Lords on February 19 the Royal Assent was given to the Firearms Act, the Unemployment Assistance (Temporary Provisions Amendment) Act, and to other Acts.

In the House of Commons on February 23 Mr. D. Grenfell moved a resolution viewing with concern the conditions revealed by the inquiry into the Gresford colliery explosion, in which 265 lives were lost, and expressing the opinion that grave responsibility rested on the country and Parliament to prevent such disasters by adopting immediate and effective measures for ensuring

that the industry was carried on under conditions of maximum safety. Captain Crookshank said that before the Government could produce proposals to deal with the greater matters relating to the mining industry they must await the report of the Royal Commission. He has issued fresh instructions to inspectors and was considering drafting regulations to deal with the use of telephones and bells, the question of fire precautions, and of coal dusting. He hoped that those regulations would be put into effect shortly. He accepted the motion.

The motion was agreed to.

THE FACTORIES BILL

The second reading of the Factories Bill, a summary of which appeared in these columns on February 13 (p. 367), was moved in the House of Commons on February 11 by Sir JOHN SIMON. Sir John said that questions of health were contained in Parts I, III, and IV of the Bill, and these would be dealt with by Sir Kingsley Wood, since they concerned the better health of the community in the widest sense.

Mr. CLYNES said the Bill proposed a large number of small changes but avoided the great issue of factory reform. It omitted to provide a proper yearly rest for the average worker by means of holidays. Lady ASTOR said the question should have been co-ordinated with education and health. Children were to be allowed to go into factories at 16 and to work a forty-eight-hour week with overtime, working in many weeks up to nine hours a day. Under 16 there was no overtime, but from 16 to 18 there would be. Accidents occurred when young persons began to be tired, and the hours for these should be limited to forty a week. The Government must raise the age of entry of children in factories to 15, and the time was ripe for this. She protested against the classification of women and young persons together, and saw no reasons why women of a certain age and strength should not work overtime.

Mr. MANDER said the provisions to restrict the hours of work of women and young persons were an advance, but why were not men brought in as well? Long hours affected men just as they affected women. The present permitted hours of sixty per week were being worked in a number of cases at the present time, particularly in the Midlands. Mr. BROOKE thought the Bill would do more than either the Board of Education or the Ministry of Health to keep the nation fit. In the textile industry to-day thousands of women and young persons worked a sixty-hour week and ten and a half hours a day, and the last two reports of the Chief Inspector of Factories showed that scandalously long hours were worked in some of the less-efficient light industries. There was too much overtime at this moment in the West Riding of Yorkshire.

Mr. BUCHANAN considered that a weakness in the present system was that the factory inspector had to carry out prosecutions. The time of the inspector was taken up with presentation of cases when he ought to be inspecting. The Bill should be changed so that prosecution of these cases should be undertaken by the Crown. A forty-eight-hour week was not much advance on the pre-war fifty-four-hour week in districts where people had been moved under slum-clearance schemes and sent to suburbs four or six miles away.

Mr. BANFIELD appealed for the abolition of night baking. Sir JOHN SIMON said he had already appointed a departmental committee under the auspices of the Home Office to go into this matter of night baking again, and if the case was as overwhelming as Mr. Banfield believed the report would presumably be in his favour. Lord Alness had consented to be chairman, and the committee had been asked to give its conclusions in time for them to be acted upon if necessary before the Factory Bill passed.

MORE INSPECTION OF FACTORIES

Mrs. TATE said the nation spent some £12,500,000 on health services for children in schools, and that money must be wasted if their health deteriorated because they went to the factories too early or had to work under rigorous conditions. At present there were 254 inspectors and 250,000 factories, or one inspector for a thousand factories. Under the Bill a much larger number of small factories would have to be inspected, and it was imperative that the number of inspectors should be sufficient. Of points in the Bill which needed to be safeguarded when the Bill was in committee she had noticed one enjoining the provision in every factory of a supply of drinking water. That would be no use unless some form of sterilized vessel was provided from which to drink the water. Every factory with 150 workers or over was to have a first-aid outfit, but she hoped that there would be somebody in the factory who understood first aid.

Mr. ELLIS SMITH said he had gone through a trade union report and was surprised at the extent to which workers suffered from hernia and ruptures. It was common for five or six men to have to lift an object from one part of the factory to another. He hoped the Bill would enforce the use of mechanical appliances for lifting extraordinarily heavy weights. He had seen girls between 16 and 30 having to carry on for eight and a half hours a day afraid to leave their machines because of the economic effect on them if they did leave their work. The Home Secretary should see that a provision was included in the Bill to allow women and girls in factories to have rest and attention if necessary. He did not see in the Bill anything regarding the risk of lead poisoning in the decorative tile side of the pottery industry—risks mentioned in the annual report of the Chief Inspector of Factories and Workshops for 1935.

Mr. SHORT said that if factory inspectors could state their opinions freely they would express anger at the cautious manner in which the Bill approached matters concerning the health, welfare, safety, and hours of labour of women and young persons. Since 1918 the House had just tinkered with the problem and the Bill was stamped on every page with the word compromise. The House ought to be legislating for a forty-hour week. He was disappointed that the Bill did not provide for expectant mothers. The Public Health Act, 1936, provided that women should not have to work for four weeks after childbirth. A period of six weeks before and six weeks after had been adopted in France, Germany, Russia, Chile, and possibly in other countries.

The debate was adjourned.

HEALTH PROVISIONS OF THE BILL

When the debate was resumed on February 15 Sir KINGSLEY WOOD commended the Bill to the House because many of its provisions embodied that advance in national health policy which was occupying attention to-day. While it was right to continue efforts to cure illness and physical defects, more, he said, should be done to prevent them. Many people looked forward to the time when doctors would be paid when people were well and fined when they were ill. There was no doubt that incapacitating sickness and accidents in industry were still heavy, and that much of that was avoidable. Public Enemy No. 1 was colds and influenza, which accounted for about 25 per cent. of absences from work. The medical profession had not yet found an instant remedy for colds and influenza. Some of the best safeguards against disease and illness, especially of a minor character, were, in addition to shorter hours and longer holidays, good housing, airy schools, good food, clean streets, and open spaces.

Their efforts, however, could not stop short outside the factory door, and much could be done in promoting the health of the working population by more medical supervision and more welfare provisions. The need of further statutory provision for the lighting of factories was clearly established, for conditions in many places were far from satisfactory. Clause 5 of the Bill provided that there should be suitable and proper lighting in every factory and in every part of the factory. The Home Secretary would have power to define by Order what was adequate and suitable illumination for factories or processes, and certain minimum standards would be laid down.

MEDICAL SUPERVISION IN SPECIAL TRADES

Under Clause 11 there was an important development towards assisting preventive medicine. Under the existing Act

there was power to require medical examinations as a permanent arrangement in codes of regulations for dangerous trades; but it would be of great value to employers and workers that arrangements for medical supervision could be made from time to time in particular works and in certain circumstances. He had in mind cases where there might be an outbreak of dermatitis where irritating substances were being used; where there had been an introduction of new chemicals likely to be injurious to the workers; or where an outbreak of anthrax was suspected. In such cases the Home Secretary could issue special regulations requiring reasonable arrangements to be made for medical supervision of the health of the people so employed. This would be a useful provision for protecting the health of the workers and for reducing short time. The Home Secretary would also be able to make special arrangements requiring reasonable medical supervision of young persons who were employed on work that might carry risk of injury to their health.

Some of the welfare provisions in Clause 8 should also have an important bearing on the general health of the workers. There was to be suitable accommodation for workers' clothing, with arrangements for drying wet clothes. He also attached importance to the facilities laid down for the seating of women in preventing excessive fatigue and ill-health. Another clause made an important modification of the law with regard to the prevention of injurious affections of the lungs. The new provisions required workers to be protected not only against the breathing of dust or fumes of an injurious or offensive character as under the present law, but against the breathing of any kind of dust to a substantial extent.

EMPLOYMENT OF WOMEN DURING PREGNANCY

The suggestion that the Bill should prohibit the employment of women in factories during the last six or eight weeks of pregnancy raised a matter of great difficulty and complexity. The British Medical Association had put forward certain views on the matter, but the Association's memorandum said that there seemed no valid reason why a pregnant woman should not perform some work of a suitable nature up to the last week or two of pregnancy, and that it would be a hardship if cessation of factory work were to be made compulsory. One of the difficulties was that if it were to be made a penal offence for a woman to be employed in a factory for a stated period before confinement it would be quite impracticable to penalize the employer, and the penalty would have to be imposed on the woman herself. Then there arose the question of who was to determine the period of pregnancy. A good many women would resent a compulsory prohibition of the kind suggested, and it must be asked whether such a prohibition might not have a bad effect by discouraging a woman from availing herself of ante-natal services at an early stage of pregnancy.

The Bill also proposed, by amendment of the law and by administrative action, to improve the medical arrangements for the examination of young persons by the certifying surgeon. The certifying surgeon would in future be required to give a positive certificate that the young person was fit for employment, and not merely a negative certificate that he was not unfit. Steps were also being taken to ensure a greater measure of co-ordination of the various State health services. The Bill made the important provision that education authorities should supply the school medical history to the certifying surgeon. By that means the surgeon would have before him the whole medical history of the person being examined. On behalf of the local authorities he (Sir Kingsley Wood) could say that they were anxious to co-operate in the efficient enforcement of the provisions entrusted to them by the Bill. The Bill would mean a great betterment in the health and conditions of many millions of industrial workers.

MEDICAL VIEWS

Sir FRANCIS FREMANTLE said that people working in modern factories were in a better state of health than they were under some of the deplorable housing conditions which the Government was doing so much to improve. He hoped that the Government's measures for physical recreation would be considered as a complement to this Bill; the more leisure the workers had and the more they enjoyed it the better. There was some medical opinion, however, which showed that for some occupations and for some persons it was not a bad thing to work a good deal more than the actual hours laid down in the Bill. Long hours of employment were not necessarily bad. It had also been found that some workers enjoyed the monotony of their work, since it required less concentration. Sir Kingsley Wood had referred to the necessity for providing for ventilation as well as for the temperature of the factories, but he had forgotten to mention a third factor—namely, humidity. The thermometer told very little as to whether or not the atmosphere was agreeable unless two other factors were taken into account—the movement of the air and the humidity of the air. It largely depended on the heat-regulating power of the body whether one was able to breathe at the optimum required for one's work. The katathermometer which registered the temperature, the moisture, and the movement of the air was not used in our factory system. An advance had been made in the appointment by the Home Office of certifying factory surgeons responsible to it and having nothing to do with the educational authorities or the sanitary authorities. Under this Bill the description was changed, and the certifying factory surgeon was called an examining surgeon. We needed a system where there was a medical officer whose job, whether part-time or whole-time, would be to study the health conditions all the way through the factory, and, when he felt it necessary, to make suggestions concerning an individual, the conditions of the factory, or the processes, so far as they affected health. It had been said that there was difficulty in employing local medical officers in these conditions, the employers objecting to the local officials going into the factories because of secret processes which they had to guard from their competitors. That was a difficulty which ought to be overcome. Properly appointed and trained officials would never be guilty of revealing secrets of any kind. There ought to be much closer connexion between the factory medical officers of the Home Office and the local medical officers of the health and the educational authorities than was aspired to in this Bill.

NEED FOR TRAINING IN INDUSTRIAL MEDICINE

It was certainly an advantage that under the Bill a dossier from the schools was to be passed on to the examining surgeon, who would examine the children going into industry, for obviously the health history of a child during school life was of great importance when he or she went into a factory. It was, however, not the same thing as he had suggested. The medical officer who had been examining the child during the whole of his or her school life was the most qualified, if he understood the conditions of the factory, to decide whether the child was fitted to go into that factory and under what sort of working conditions a certificate should be issued. He regarded the Bill as only a temporary measure while they were thinking out a way in which they could improve the general liaison of the health services. Industrial medicine had become a matter of vital importance to industry and to the health of the nation, and must be under medical officers who were specially trained. In factories at the present time the medical men had not been trained in industrial medicine. Hitherto it had been entirely left out of the general education of the medical man. In the special post-graduate services dealing with public health it was left out because the public health services did not deal with industrial medicine. There was growing up a generation of medical men who were studying this question, but he was afraid that the ordinary medical men in the country were not being properly trained for what he believed would be the duties which would be cast on them in future in connexion with the health of the nation.

NOTIFIABLE DISEASES: OMISSION OF CANCER

Sir ERNEST GRAHAM-LITTLE urged that a larger measure of medical supervision should be provided under the Bill. He did not think that there was any medical reason why they

should differentiate between men and women in the Bill; he would like the division simply to be between adults and adolescents, the latter, of course, requiring some age qualification. Special measures might be called for on account of age but not of sex, with the one exception of pregnancy. Pregnancy ought to be regarded as in the nature of an illness and treated according to the individual case. There ought to be no hard-and-fast rule, such as four weeks' rest before and after delivery, but individual patients should be treated according to their circumstances. They ought to legislate with some attention to basic facts. He pleaded for much better medical service in factories. The Chief Inspector of Factories made a very impressive statement in 1932 when he said that they had come to the limit of usefulness in devising gadgets to prevent accidents, and that more consideration should be given to the human factor. That was borne out by statistics. One could predict that a certain group of persons would have accidents. It was the same in cases of idiosyncrasy. Out of the total number of disabilities which caused absence from work in factories practically one-half were due to external irritants and disease of the skin.

Clause 62 of the Bill dealt with notifiable industrial diseases. The five diseases declared notifiable were: lead poisoning, phosphorus poisoning, mercurial poisoning, arsenical poisoning, and anthrax. Why those diseases were singled out he did not know. The figures for lead poisoning were much larger than the others. For three years the figure was 535 cases of lead poisoning, with 123 deaths. In the case of phosphorus poisoning, its inclusion seemed specially curious, for the last recorded cases were in 1910. That was very easily explained. In 1908 the Phosphorus Poisoning Act was passed, and it immediately stopped accidents from that cause. As regarded mercurial poisoning, the total number of cases in the last three years was only two, and there were no deaths, while in the case of arsenical poisoning there were five cases and no deaths. The most important section was that of anthrax, which was decreasing very rapidly. The number of cases of anthrax in the last three years was sixty and the mortality was ten. By far the most important industrial accident or disease was cancer, which was on the increase all the time. It was not notifiable. In the last three years there were 535 cases and 123 deaths. The cases of cancer referred to in certain reports arose from two causes—oil and tar. Oil of course was the lubricant used in the cotton industry, and it was the cause of an extraordinary large mortality. In the last report of the Registrar-General the figure for the mortality from cancer produced by oil was 4 per 1,000,000 of the ordinary population, but among cotton spinners it was 134 per 1,000,000. It had been ascertained that the production of the disease by oil depended upon the nature of the oil—the heavier the oil the more cancer it produced; and experiments which had been tried, in Manchester chiefly, showed that these oils could be identified and that it was possible to determine beforehand what would happen if a certain oil was used. A formula was now available which could be very easily applied, and by which it was possible to determine before a particular oil was used what was likely to result from its use in the matter of cancer production and the injury to the skin caused thereby. Although that information had been quoted in the medical press for the last three or four years he saw no mention of it in any of the factory inspectors' reports. This information had been passed on to the body which dealt chiefly with petroleum manufacture. Tar was another important cause of cancer. It was very largely used in the manufacture of patent fuel, and the mortality among tar workers was high. The incidence of cancer caused by tar was 4 per 1,000,000 of the general population, but in the case of tar workers it was 695 per 1,000,000, and in the case of chimney sweeps, who were subject to somewhat similar conditions, it was 534 per 1,000,000. A statement in the report of the Chief Inspector of Factories for 1935 showed what could be done by really efficient medical supervision. The Inspector said that the cost for compensation in the group with periodical medical examination amounted to £1,390, whereas in the other group the cost was £1,624; so that there was a clear annual saving as a result of periodical medical examination. The opportunity afforded by this Bill to increase the amount of medical supervision should not be lost. Medical supervision should be provided for all workers, irrespective of age or sex.

GOVERNMENT REPLY

Mr. GEOFFREY LLOYD, replying to the debate, said that the provision in the Bill in regard to medical supervision gave an important new power. It enabled the Home Secretary in several circumstances to see that there was undertaken proper medical supervision on certain processes. Fortunately they had one or two examples where medical supervision had taken place, not compulsorily but voluntarily. A few years ago there were developments in some of the factories making accumulators for motor cars which led to an increase in lead poisoning. They had a considerable number of cases—over 100 in one year—and, being progressive, the firms approached the Home Office, which arranged that there should be medical supervision in these works. A young doctor was put in charge of the work and went into it very scientifically. Immediately there was the slightest indication of lead in the body the man was either taken off the work in which lead was used or a radical alteration was made in the processes from the point of view of the elimination of lead. Owing to the measures that were taken the cases of lead poisoning dropped rapidly, and during the last three or four years there had been in one factory only one or two cases at most and in the others none.

The Bill was read a second time without a division.

Scottish Maternity Services Bill

Consideration of the Maternity Services (Scotland) Bill by a Standing Committee of the House of Commons was completed on February 16. The committee then resumed its discussion of the new clause proposed by Mr. Graham Kerr, which deals with facilities for instruction in midwifery. Mr. GRAHAM KERR said the object of the clause was to ensure that the existing method of training students would be maintained, and if possible improved. Mr. WESTWOOD said the proposed clause would provide living experiments for those who had just entered on their studies as medical men or as midwives, and would extend facilities to "any persons undergoing training," though this might be the first day of training. Mr. T. M. COOPER said he did not think the new clause was an appropriate measure for ensuring continuity in the supply of skilled doctors and midwives. The clause literally read would involve an intolerable invasion of the liberties of private people, and would require the local authority to secure that adequate facilities for domiciliary instruction were made available to any person engaged in training. That was too wide. Mr. G. A. MORRISON said hospital instruction itself was not adequate. He had figures which showed that 68 per cent. of the births in maternity hospitals were abnormal, and it was not advisable to study the normal from the abnormal. Mr. ELLIOT hoped that Mr. Kerr would withdraw the clause.

Mr. Kerr did not feel prepared to do this, and the clause was negatived without a division.

PANEL OF DOCTORS PRACTISING MIDWIFERY

Mr. MATHERS then moved a new clause as follows:

> "It shall be lawful for a local authority to appoint a number of registered medical practitioners to form a panel for the purposes of Section 22 of the Midwives (Scotland) Act, 1915, and when such panel is so formed the medical practitioner called to her assistance by a midwife provided by a local authority under Subsection (1) of Section 1 of this Act shall be selected from the panel so formed."

In proposing that the clause be read a second time Mr. Mathers said his object was to ensure that a midwife who found herself faced with some difficulty or abnormality should be able to call in not merely a medical practitioner, but one who was skilled in midwifery. A statement provided by Glasgow Corporation showed that in Glasgow during 1935, out of 544 medical practitioners whose practice included service under the National Health Insurance Acts, 144 did no midwifery, 166 attended from one to five cases, 82 attended from six to ten cases, 86 attended from eleven to twenty cases, and 66 attended over twenty cases during the year.

It would not be possible in country districts to have medical practitioners devoting their time to special aspects of work, and the clause, therefore, was made optional. In Glasgow in 1935 medical help was called for by midwives in 33 per cent. of the births occurring in that year. In 1934 the percentage was 32 and in 1933 it was 31. That proved the need for providing that the midwife should be able to call to her aid at the earliest moment one who could bring the proper skill to bear on the case.

Mr. ELLIOT said the proposed new clause could not be complete unless penal provisions were incorporated, and against whom would fine and imprisonment be proposed? Would it be against the midwife who summoned the doctor or against the doctor who attended? To suggest that a local authority should decide who should not carry out the practice of midwifery under the Bill would give a power never yet given to any local authority. He sympathized with the object of the clause, but, after all, the midwife was well acquainted with those who practised midwifery in the area where she worked. Mr. WESTWOOD and Mr. STEPHEN suggested a voluntary panel of practitioners specially skilled in midwifery. Mr. ELLIOT said there would not be difficulty in compiling a list of those who were practising midwifery. The local medical practitioners would be better able to give this information than anybody else, and such a list could be available to the midwife. Before the report stage he would consider whether such a provision could be incorporated in the statute.

Mr. MATHERS then withdrew the proposed new clause.

The committee approved the schedules of the Bill and consideration on the report was completed, the Bill thereafter being reported to the House.

Unemployed Men at Papworth

Matters relating to Papworth Tuberculosis Sanatorium and Papworth Village Settlement were raised in the House of Commons on February 17 on the motion for the adjournment by Mr. ROWSON. He said disquieting information concerning Papworth had come into his possession, and he had received unsatisfactory answers on the subject from the Minister of Labour and the Minister of Health. A case had been brought to his notice where a young man who had suffered from tuberculosis for a long time, and was known to be in a fairly acute stage, was asked to prepare himself to go to work in the printing shop, but collapsed and died within fifty minutes. An alternative story was that this man was on his way to see the doctor, but Mr. Rowson was convinced that he had died on the way to work. He died from a pulmonary aneurysm. It ought to be possible for medical men who continually supervised tuberculous cases to find out the stage in the disease when a thing like that might happen. Mr. Rowson recalled that he had already put questions to the Minister of Labour and the Minister of Health about men being sent to Papworth to be employed in the workshops side by side with the victims of tuberculosis. All medical men with whom he had come in contact said there was a possibility of infection from merely breathing the same atmosphere as a tuberculous patient. He could not appreciate the position which the Minister of Health had taken up, and the practice of sending non-tuberculous workers to Papworth should be ended as soon as possible. Mr. Rowson said he had lately visited Papworth, and found men there from the distressed areas, who told him they had not been warned of the kind of place in which they were to be employed, and that they dared not leave on their own account, because if they went away there would be no unemployment benefit for them. In the place where these men were working there were other non-tuberculous men, and also patients suffering from tuberculosis in various stages.

Captain BRISCOE said that men employed at Papworth asked him to let it be known that the vast majority of workmen there were more than satisfied with their conditions.

Mr. ERNEST BROWN quoted a letter from Sir Kingsley Wood, who stated as a result of careful inquiry that it was not the fact that persons suffering severely from tuberculosis were employed until a few days before death, save in the exceptional case of a patient, otherwise fit, dying from rupture of a pulmonary aneurysm, which could not be foreseen. Mr. Brown added that the man mentioned by Mr. Rowson died on the way to a medical inspection, and that the only work given him to occupy his mind was moving a small lever with one finger. Papworth was so valued by those who suffered from tuberculosis that the settlement was full. Since August thirty-eight trainees from four different centres had gone voluntarily to Papworth, and of these fourteen had left. All fourteen left the institution without any harm whatever, and only one was disallowed benefit. Besides twenty-four trainees now working there, eighty-eight ordinary workmen were engaged under similar conditions, who had no fear and received no harm.

The discussion then concluded.

In a reply to Mr. Sexton, on February 18, Sir KINGSLEY WOOD said Papworth Village Settlement, including the sanatorium hospital, was registered as a war charity under the War Charities Act, 1916. In a further reply to Mr. Rowson on the same date Sir Kingsley said he had approved the sanatorium hospital at Papworth as an institution for the treatment of tuberculous patients sent by local authorities. It was inspected from time to time by his officers, and was to that extent under the supervision of the Ministry of Health but not under that Department's control.

Inquests on Infants: Doctors' Fees

Sir KINGSLEY WOOD told Sir Arnold Wilson on February 17 that his attention had not been called to the refusal of certain coroners to pay the usual fees to doctors in respect of statements made to the police as to the cause of death of infants. The Ministry had not advised doctors in such circumstances to refuse to make statements. Sir ARNOLD asked whether, having regard to the suffering involved to the persons immediately concerned and to the importance of avoiding unnecessary inquests, Sir Kingsley would endeavour to secure uniformity in the practice of coroners in this matter by introducing legislation if necessary. Sir KINGSLEY, in reply, suggested that Sir Arnold should supply him with particulars of any cases of hardship which he had in mind.

Sale of Methylated Spirits in Scotland

The House of Commons, on February 17, gave Miss FLORENCE HORSBURGH leave to bring in a Bill to control the sale in Scotland of methylated spirits and of methylated spirits in admixture and for purposes connected therewith. She said the evil effects of the drinking of methylated spirits in Scotland were well known. The Bill was based on an enactment by the Parliament of Northern Ireland, which had proved satisfactory. Retailers of methylated spirits had to obtain a yearly Customs and Excise licence. The Bill proposed to attach to the granting of a licence further conditions, such as registration of the applicants with the local authority, the keeping of a record of sales, and the selling only on receipt of an order signed by the purchaser stating the purchaser's address and the purpose for which the spirits were required. The measure had the approval of a large section of public opinion in Scotland.

The Bill was read a first time and its text was subsequently issued.

Cambridge Scientists' Anti-War Group

On February 22 Mr. PARKER asked the Home Secretary if he would make an investigation into the observations of the Cambridge scientists as the result of their examination of recommendations put forward by the Air Raids Precautions Department of the Home Office, and if he would publish the full scientific evidence on which the proposals for the gas-proofing of rooms in private houses had been based.

Mr. GEOFFREY LLOYD said he presumed Mr. Parker referred to the Cambridge Scientists' Anti-War Group. This group must not be confused with the general body of Cambridge scientists. The Government was advised in regard to these matters by the most distinguished scientific experts not only from Cambridge but from Oxford and other universities. The observations of the Cambridge Scientists' Anti-War Group had been carefully investigated, with the result that both the experiments themselves and the deductions made from them

had been proved to be open to grave criticism. It would not be in the public interesct to disclose details of the experiments on which the Government's plans were based, but those experiments were conducted with actual war gases liberated under practical conditions, and the precautions proposed would be effective in affording a very great measure of protection.

National Health Insurance Regulations.—Sir KINGSLEY WOOD told the House of Commons on February 17 that the coming into operation on January 1, 1937, of the National Health Insurance Act, 1936, necessitated the revision of all regulations and orders made under the Acts previously in force. Good progress had been made with this work, and as soon as it was complete the preparation of a new edition of the Statutes, Regulations, and Orders relating to national health insurance would be put in hand.

Waiting Period for Health Insurance Benefit.—Mr. ERNEST BROWN informed the House of Commons on February 23 that the Government accepted a recommendation from the Unemployment Insurance Statutory Committee that the waiting period for the receipt of benefit should be reduced from six to three days, and that there should be a relaxation of the conditions under which more than 156 days of benefit may be drawn in the benefit year. A resolution would be tabled to make the reduction in the waiting period effective from April 1.

Medical News

The Royal Society of Medicine is giving a reception on May 10 next, at 8.30 p.m., in order to celebrate Coronation Week. It is the desire of the council to entertain on this occasion medical men from the British Empire from over-seas, whether Fellows of the Royal Society of Medicine or not, who will be in London for the Coronation. As accommodation is limited it would be of assistance if medical men wishing to avail themselves of the society's hospitality on this occasion would communicate with the secretary, 1, Wimpole Street, W.1, not later than May 1.

A course of lectures on "Digestion and Indigestion" will be delivered by Dr. Edward Mellanby, F.R.S., secretary of the Medical Research Council, before the Royal Institution, 21, Albemarle Street, W., on Tuesdays, March 2, 9, 16, and 23, at 5.15 p.m.

A Chadwick Public Lecture on "Legal Aspects of Sanitary Science: Public Health Acts, 1875–1936" will be delivered by Mr. W. T. Creswell, K.C., in Gray's Inn Hall, Holborn, W.C., on Tuesday, March 9, at 8.15 p.m.

The annual clinical meeting of Guy's Hospital Dental School will be held in the dental department on the morning and afternoon of Saturday, March 6, when demonstrations of modern procedures will be given by members of the staff and cases of clinical interest shown to past students.

The thirty-eighth annual meeting of the Lebanon Hospital for Mental Diseases, Asfuriyeh, near Beirût, Syria, will take place in the Winter Garden of the Cora Hotel, Upper Woburn Place, W.C.1, on Tuesday, March 2, at 3 p.m., with the president, Dr. R. Percy Smith, in the chair and Dr. Nathan Raw as opening speaker.

The third Conference of the Austrian Association for the Study of Diseases of the Throat, Nose, and Ears will be held at Innsbruck on May 28 and 29, when various addresses, followed by discussions, will be given. The official report will be published in the *Monatsschrift für Ohrenheilkunde und Laryngo-Rhinologie*, including the text of the addresses. Notice of intention to participate should be received by the conference director, Schottenring 24, Vienna, I, not later than April 15.

During the week ended February 20 the number of deaths ascribed to influenza in the 122 great towns (including London) of England and Wales was 423, compared with 697 in the preceding week. In London the number of deaths from influenza was thirty-three, against fifty in the preceding week, and the notifications of pneumonia in London were eighty-seven against ninety-four.

The twenty-seventh Hospitals, Nursing, Midwifery, and Public Health Exhibition and Conference will be held at the New Horticultural Hall, Westminster, S.W., on March 1, 2, 3, 4, and 5, and will be open from 11 a.m. to 7 p.m. daily (except the first day, opening 2.30 p.m., and the last day, closing 6 p.m.). The sections of the exhibition include occupational therapy, anti-gas and air raid precautions, mothercraft, electricity, architecture, and oxygen. There will be conferences on nursing, midwifery, public health (under the presidency of Dr. William C. Gunn), and medical gymnastics, and receptions have been arranged for every day of the conference. Members of the medical profession, municipal officers, and health workers generally will be admitted to the exhibition on presentation of their visiting cards. Particulars may be obtained from the honorary convener, Colonel R. J. Blackham, C.B., C.M.G., 40, Holland Park, W.11.

The 162nd anniversary dinner of the Medical Society of London will be held at Claridge's on Thursday, March 4, at 7.45 p.m., with the president, Sir William Willcox, in the chair.

The German Society for Combating Rheumatism will hold a congress at Wiesbaden on Sunday, March 14. Further information can be obtained from the general secretary, Dr. Krone, Potzdamer Platz 1, Berlin, W.9.

A Science and Building Exhibition, to be held at the Building Centre, 158, New Bond Street, London, W., is being arranged by the Department of Scientific and Industrial Research. It will be opened by Mr. Percy Thomas, P.R.I.B.A., on March 1, and will remain open until March 25. The object of the exhibition is to illustrate the work carried out by the various organizations controlled by the Department, or associated with it, of interest to the industry in the solution not only of general building problems, but also of some of the more specialized problems which the industry is called upon to face. The exhibition is very wide in its scope, and among those participating are the Building Research Station, the Fuel Research Station, the National Physical Laboratory, the Water Pollution Research Board, and the Department's chemical research laboratory.

A medical tour, organized by the Société Médicale du Littoral Méditerranéen, will take place from March 21 to 28. All the resorts on the French Riviera from Hyères to Mentone will be visited, and receptions and scientific demonstrations will be held. All medical men and their families are invited to join at the inclusive charge of 1,000 francs, plus a booking fee of 50 francs per family. A reduction of 40 per cent. will be granted by the French railway companies. A children's welfare congress concerning climatic conditions will also be held during the period under the presidency of Professor Nobécourt of the Paris Faculty of Medicine. Particulars can be had from the Société Médicale, 24, Rue Verdi, Nice (A.M.), and the Federation of the Health Resorts of France, Tavistock House (North), Tavistock Square, London, W.C.

Some months ago the *Veterinary Journal* announced a proposal to present Sir Frederick Hobday, the principal and dean of the Royal Veterinary College, with his portrait in oils—the artist being Mr. John Hassall. The portrait was presented to Sir Frederick by the Duke and Duchess of Portland, on behalf of the subscribers, at the Connaught Rooms on February 18.

A committee has been appointed, with Professor Sergent as chairman, to collect funds for and deal with the erection of a monument to Laennec in Paris. Contributions may be sent to the treasurer of this committee, Monsieur Doury, 4, Rue de la Meutte, Paris XVI.

Letters, Notes, and Answers

All communications in regard to editorial business should be addressed to THE EDITOR, BRITISH MEDICAL JOURNAL, B.M.A. HOUSE, TAVISTOCK SQUARE, W.C.1.

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QUERIES AND ANSWERS

Cure for Chilblains?

Captain CHARLES SEARLE writes: The following case may be of interest: A woman I had been treating for severe chilblains of the fingers for two months by the conventional methods with no improvement developed influenza, which was accompanied by a pyrexia of 103° F. for forty-eight hours. On the third day of the illness all her chilblains had disappeared, and have not returned during the last three weeks. The question arises as to whether their disappearance was incidental to the pyrexia and due to the patient remaining in bed and in an even temperature, or whether due to her pyrexia causing improved circulation to the fingers. I can find no mention of this phenomenon in the literature at my disposal.

External Use of Iodine

"E. P." writes: As regards Dr. Macaulay's contention (February 13, p. 374) that iodine is of no use applied to cuts and abrasions, I think there is a good deal of truth in his argument. I should like, however, to know what he proposes in place of it.

Income Tax

New Practice—Replacement of Car

"W. B." bought a car in July, 1933, and commenced in practice in November, 1933, and hitherto has been allowed three-quarters of the expense of running the car; he intends to claim seven-eighths for 1936-7. He now proposes to buy a new car, retaining the old one for family use. What should he claim?

*** So long as the old car is available for professional use—for example, in the case of a temporary breakdown of the new one—"W. B." may find it impossible to claim a "replacement" allowance. In all the circumstances we advise him to claim "depreciation" for the past and present years, starting with the value of the car as at November, 1933, and claiming four-fifths to seven-eighths of 22 per cent. on the usual "written down" basis.

Allowance for Bad Debts

"J. H." explains that the inspector of taxes was "dissatisfied with the old method of valuing the book debts," and in consequence a "specific valuation" was made. On that basis the former reserve was excessive by £300, and the inspector proposes to assess that amount for the back years.

*** The income tax authorities are entitled to rectify any under-assessments arising from excessive reserves so far as the current and six previous years of assessment are concerned, but no more. If, therefore, the excess arose on the accounts for 1929 or a later year—1929 is the year determining the liability for the financial year 1930-1—the over-allowance can be dealt with by additional assessment. It does not seem necessary that the inspector should be able to show in which year the under-assessment arose; the general evidence being available the allocation of the £300 between the various years would be a matter of agreement after discussion or for settlement by the commissioners on appeal.

LETTERS, NOTES, ETC.

Uraemia in Ophthalmology

Dr. HORATIO MATTHEWS (ophthalmic surgeon to the King Edward Memorial Hospital, Ealing) writes: Among the points to be watched in the treatment of eye cases are the occasional idiosyncrasies to atropine and hyoscine. Recent cases of death after cataract extraction in aged people in whom uraemia spoilt an otherwise perfect cure suggest that possibly there is more than meets the eye in certain of the troublesome post-cataract-extraction manias with which one is worried from time to time. Is it possible that blood urea tests before the operation might reveal both the cause of the so-called "atropine mania" and of the cataract itself? In the uraemic cases referred to there was no previous sign of renal disorder beyond a slight amount of seemingly innocent albuminuria.

Academic Costume

Dr. R. R. PREWER writes from the Infants Hospital, Vincent Square, S.W.: I beg to point out that the answer to "X. Y. Z.'s" suggestion of last week is not correct. The right to wear an academic hood is by no means reserved to those who hold university degrees. Most of the theological colleges in this country grant hoods to their diplomates, and so do some twenty other learned societies and institutions. If music, art, and philosophy are rewarded in this way it seems hard that physicians, surgeons, and dental surgeons should have only an incomplete academic dress. I agree with "X. Y. Z." that the great medical corporations should prescribe hoods for their members and licentiates, and thereby add to the dignity, not only of their diplomas but of those corporations themselves.

Cancer Cells and Revolutionary Groups

Mr. GEORGE SACKS, F.R.C.S., writes from Capetown: Mr. W. H. Ogilvie combines the art of writing with the art of instruction so admirably that you could have made no better choice for the first article in the new *Journal*. In it he says truly that the humanity of surgery has three aspects—science, art, religion; we know, we feel, we believe. I suggest that we need not confine these aspects of our humanity to surgery alone. The three are necessary to a sane and balanced whole, he says. They are just as necessary to a sane and balanced whole in our evaluation of social and political structure. When he compares the appearance of lawless cancer cells in the human body to the emergence of revolutionary groups in the body politic he makes a comparison which a sane and balanced judgement might hesitate to accept. Cancer is always an evil thing in the human body, and it never in any circumstances improves the health of the organism it has invaded. Revolution, on the other hand, may transform the health of the body politic. Since I know how anxious Mr. Ogilvie is to know as well as to feel and believe, I implore him to read *Armed Intervention in the U.S.S.R.* The book, a much-neglected one, is written by Mr. and Mrs. Coates and is published by Gollancz. In the light of knowledge he might care subsequently to revise his opinion as to the responsibility for "the slaughter in cold blood of some three million innocent people." My point is that if we are to introduce social judgements into records of surgical reflections we should be as careful to use the three aspects of our humanity in our sociology as in our surgery.

Bismuth Therapy

We have received from Pharmaceutical Specialities (May and Baker) Ltd. a copy of their latest publication, *Bismuth Therapy*. This little book outlines present-day views on the subject, and marks the twenty-first year of this firm as manufacturers of anti-syphilitic preparations.